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The Maternal Birth Experience & Infant Attachment: A Mixed Methods Study

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The Maternal Birth Experience & Infant Attachment: A Mixed Methods Study

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Dedication

This dissertation is dedicated to every woman who will and has experienced birth – may you know that your birth experience is important and deserving of acknowledgment. Becoming a mother looks and feels different to every woman, and no mother is perfect. No mother should have to struggle on her own; I urge any mother in need not to hesitate in asking for help and to be persistent in getting it. May we move forward as a civilization, with open ears, minds and hearts to honor the *whole* birth experience.

Acknowledgements

My sincere appreciation goes out to all those before me who made this study possible – your countless hours of research and data collection have culminated in immensely rich data that will continue to produce meaningful knowledge for years to come. I hope I have made you proud. Thank you to the mothers who shared their birth experiences and allowed their infants to participate in the ongoing research. You have provided more insight into the family system and child development than you could imagine, and I vow to dedicate my career path to honoring these uncovered truths.

I would like to thank my family for always believing in me, even though they may not have understood what I was actually doing at times. I never doubted their confidence in my ability to achieve any goal. I cannot thank my partner Austin enough for his extreme patience and support, when I was tired, stressed and overwhelmed. I don't know how I would have made it this far without you, Austin. Lastly, thank you to my friends who got me out of the house and kept me sane, yet understood that I couldn't always be available.

I give my utmost admiration to my committee. Not only have you each dedicated your lives to uncovering the intricacies of family relationships and the effects they have on society, but your work is of the highest integrity and standard. I am honored to learn from you and work with you. A special thank you to Debby, who ignited my passion for all things "attachment", and Sam, who talked me into attending the World Congress on Infant Mental Health where I became captivated with the maternal birth experience.

Abstract

The Maternal Birth Experience & Infant Attachment: A Mixed Methods Study

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The maternal birth experience is a complex event with implications for later maternal and infant well-being. The present study followed 44 first time mothers to parenthood, to understand the relation between multiple aspects of the maternal birth experience, depression over the transition to parenthood and mother-infant attachment.

Both objective and subjective aspects of the birth experience were analyzed in the current study; mothers were interviewed about their birth experience around 12 months postpartum. Additionally, a linguistic analysis of nonfluency was performed on the transcripts of mothers' responses in the birth experience interview.

Three research questions explored in this dissertation include: 1) How does change in depression over the transition to parenthood, aspects of mothers' recalled birth experiences and mother-infant attachment relate to one another? (quantitative), 2) Does a negative maternal birth experience interact with nonfluency in recall to predict mother-infant attachment? (quantitative) and 3) Which underlying themes and typologies in

mothers' recalled birth experiences help explain why some mothers differ from the norm in terms of either their birth experience, depression trajectory, and/or mother-infant attachment security? Do case studies reveal important differences? (qualitative).

Results indicate mothers in the current study had typical birth experiences consistent with data on hospital births for middle-class women in the U.S. Maternal depression slightly decreased over the transition to parenthood. Birth risk factors including maternal support, control (marginal) and pain medication consumption were related to maternal depression symptoms. Nonfluency in mothers' recalled birth experience transcripts was unrelated to birth risk but related to mothers' postpartum depression. Both labor pain medication consumption and nonfluency were independently related to infants' disorganized attachment. Nonfluency interacted with birth risk to predict infant attachment security and organization, above and beyond change in maternal depression.

Quantitative results are interpreted with results from qualitative, thematic analyses and underscored with case study examples. The findings of this dissertation indicate a possibility that either mothers' unresolved state or the presentation of postpartum stress may be behind her vulnerability to a high-risk birth and results in her nonfluency surrounding the topic, which proceeds in mother-infant attachment difficulties. Applications and future research directions are discussed.

Table of Contents

List of Tables xiii

List of Figures xiv

INTRODUCTION 1

Birth & Attachment 2

History 2

Neurohormonal Biology & Attachment 5

Perinatal Risk & Attachment 8

Maternal Attachment Behavior 10

Maternal Depression & Attachment 12

The Maternal Birth Experience 13

Predictors of Maternal Birth Experience 13

Measuring Maternal Birth Experience 15

Linguistic Assessment of the Birth Experience 16

Birth Experience & Caregiving 18

Attachment Theory 20

History 20

Infant Attachment 21

Classifying Attachment 22

The Strange Situation 23

Consequences of Infant Attachment 26

The Current Study 27

Design 27

Research Questions & Hypotheses 28
Phase 1: Quantitative 28
Research Question 1 28
Research Question 2 28
Phase 2: Qualitative 28
Research Question 3 28
METHODOLOGY 30
Participants & Recruitment 30
Procedure 31
Measures 31
Demographics 31
Depression 32
Birth Experiences 32
Preparation for Analysis 33
Linguistic Analysis 33
Risk Index Coding Scheme 33
Attachment Classification 36
Preparation for Analysis 36
Data Analyses 37
Quantitative 38
Qualitative 39

RESULTS **41**

Phase 1: Quantitative Results 41

Descriptive Statistics 41

Maternal Depression 41

Birth Experience Risk Scale 43

Nonfluency during the Birth Experience Interview 46

Infant Attachment 46

Correlations 47

Depression 47

Nonfluency 47

Birth Experience 48

Interactions 48

Exploratory Analyses 50

Correlations between Study Variables 50

Phase 2: Qualitative Results 52

Five-step Thematic Framework 52

Themes in Mothers' Birth Experiences 52

Support from others 53

Lack of control 55

Coping through pain medication 56

Benefit of child outweighs obstacles of childbirth 57

Typologies 57

Case Studies 59

Case Study 1: Kathy 59
Kathy's birth experience 60
Summary of Kathy's Case Study 61
Case Study 2: Sarah 61
Sarah's birth experience 62
Summary of Sarah's Case Study 63
Case Study 3: Elizabeth 64
Elizabeth's birth experience 64
Summary of Elizabeth's Case Study 66
DISCUSSION 69
Depression 70
Depression & Nonfluency 71
Birth Risk 71
Depression & Birth Risk 72
Exploratory Findings 73
Nonfluency 75
Nonfluency & Birth Risk 75
Infant Attachment 76
Correlates 77
Depression 77
Birth Risk 77
Exploratory Findings 77
Nonfluency 80

Interaction Effect: Birth risk & Nonfluency 82
Qualitative Interpretation 83
Themes 83
Typologies 84
Case Studies 85
Kathy 85
Sarah 86
Elizabeth 86
Applications 87
Future studies 87
Strengths & Limitations 88
Conclusions 88
Appendix A 90
Appendix B 92
Appendix C 94
References 96

List of Tables

Table 1. Maternal Depression as measured by the CES-D and Retrospective Accounts 42

Table 2. Maternal Birth Experience Risk Factors....45

Table 3. Observed Infant Attachment Classification Frequencies versus Expected Frequencies 47

Table 4. Summary of Multiple Binary Logistic Regressions Predicting Infant Attachment....50

Table 5. Mothers selected for case study analysis 68

Table 6. Correlations between Maternal Depression, Birth Experience Risk Factors, Birth Interview Speech Patterns and Infant Attachment....94

List of Figures

Figure 1. An etiopathogenic model of perinatal neurobiological disruption 6

INTRODUCTION

Giving birth to a baby is a monumental event in a woman's life. According to the life course perspective, childbirth is a major life event and part of a critical life transition (Rutter, 1989). Life course events, by definition, are affected by the previous life course and, in turn, have lasting effects on the physical and mental health throughout the future life course (Osler, 2006). Additionally, from an attachment theory perspective, this transition requires the mother to shift from seeking protection and care from her attachment figures to providing protection, comfort and care for her child (George & Solomon, 2008). The adaptation of this shift in attachment behavior is essential in understanding the formation of the parent-child relationship. Thus, the process of childbirth and transition to parenthood, as a life event, is a vulnerable period in which the birth experience is at the crux and intervention to combat negative trajectories is important.

Consequences of a negative birth experience may include postpartum stress and/or depression and issues with maternal efficacy and caregiving, all factors related to the quality of the mother-infant relationship (Ayers & Pickering, 2001; Righetti-Veltema, Conne-Perréard, Bousquet & Manzano, 1998; Bell, Andersson, Goding & Vonderheid, 2018). The quintessential marker of the mother-infant relationship, mother-infant attachment security, will be examined in the current study along with mothers' holistic birth experience and depression over the transition to parenthood. It is known that medical interventions during childbirth are linked to insecure mother-infant attachment (Olza-Fernández, Gabriel, Gil-Sanchez, Garcia-Segura & Arevalo, 2014; Sprangler, Fremmer-Bombik & Grossman, 1996; Udry-Jørgensen et al., 2011; Waters, Vaughn & Egeland, 1980). Hence, intervening at childbirth, to mitigate negative trajectories, is

even more salient considering the potential of these effects on mothers to affect their child's development.

Stable, responsive, and nurturing caregiving early in life, characteristic of caregivers of infants with secure attachments, is associated with better physical and mental health, fewer behavior problems, higher educational achievement, more productive employment, and less involvement with social services and the criminal justice system in adulthood (Heckan, 2007; Schweinhart et al., 2005). Specifically, infants with anxious and avoidant attachments were found to have higher instances of serious physical health issues related to inflammation (i.e., cancer) as adults, in comparison to secure infants (Puig, Englund, Simpson & Collins, 2013). In addition, insecure infants more often have poorer quality adult relationships and infants with a disorganized attachment strategy are at increased risk of developing a psychopathology in their lifespan (Styron & Janoff-Bulman, 1997; Lyons-Ruth, Bronfman & Atwood, 1999). Thus, understanding the implications of birth experience on infant attachment can have life changing potential.

Birth & Attachment

HISTORY

The experience of pregnancy and childbirth has long been posited to affect attachment behavior, or bonding, between mother and infant. Physicians and scientists alike have remarked on the ability of the birth experience, notably medical intervention and the separation of mother and infant in the perinatal period, to result in attachment-related, bonding difficulties such as mothers' negative perceptions of their infants and insensitive caregiving (see review in Sugarman, 1977). By the end of the 1950s, the bidirectional processes of attachment between

mother and infant, including innateness, learned components and hormonal bases, were studied and published and thus the question of childbirth's role in these processes developed (Bowlby, 1958; Winnicott, 1960). The history of attachment theory will be discussed in depth in Chapter 3 of this dissertation. By the early 1960s, common aspects of the American birth experience (i.e., medical intervention, hospitalization, etc.) began to be studied in terms of their effects on maternal psychology (Bibring, 1959), neonate behavior (Brazelton, 1961; Sinclair et al., 1965; Stechler, 1964), and the mother-infant relationship (Bibring et al., 1961; Helfer & Kempe, 1968). The 1950s and -60s were fraught with overly medicated childbirths during which it was common for mothers to be hardly conscious (Behrmann, 2003). This was followed by calls for a more natural experience of labor and delivery, and techniques delineating natural coping strategies for childbirth pain were published, notably the "Lamaze" method of childbirth (Lamaze, 1970). By the end of the 1970s, it was clear to researchers and physicians that many common practices surrounding labor and delivery in the U.S., including the administration of pain medication, heart rate and contraction monitoring, the horizontal position of delivery beds, labor induction, Cesarean section, episiotomy, separation of mother and infant following delivery and tests and medical procedures practiced on the neonate following delivery, were inconsistent with the needs of, unbeneficial, or even harmful to the physical and mental health of the mother and infant (Sugarman, 1977).

Although the negative consequences of such commonly used practices during labor and delivery were understood over 40 years ago, the same procedures are still widely practiced today (Sakala & Correy, 2008). The calls for practicing techniques consistent with naturally evolved birth processes, minimizing medical intervention and avoiding separation of mother and infant, are left mostly unheard by the medical field and policy-makers in the U.S (Sakala & Correy,

2008). The most recent estimates from the Third National U.S. Survey of Women's Childbearing Experiences show that during childbirth 83% of mothers were given pain medication, 68% were instructed to lie down horizontally, 50% experienced synthetic oxytocin to induce labor, 31% had Cesarean sections, 36% had their membranes broken, and 53% were not with their infant the majority of the first hour after birth (Declercq, Sakala, Corry, Applebaum & Herrlich, 2013). Today, interest groups are still working hard to push policy briefs focused on implementing "evidence-based maternity care" in American hospitals (Sakala & Correy, 2008).

The current study aims to add to this discussion by investigating how infant attachment, a highly predictive aspect of development with potential impacts on functioning throughout the lifespan, relates to aspects of the birth experience and depression over the transition to parenthood. Past research has denoted links between factors related to infants' perinatal risk (i.e., low birth weight, prematurity, neonatal intensive care unit experience, etc.), maternal depression, and medical intervention during childbirth to infants' insecure attachment (Sprangler et al., 1996; Udry-Jørgensen et al., 2011; Waters et al., 1980; Atkinson et al., 2000; Martins & Gaffand, 2000; Hayes, Goodman & Carlson, 2013; Van Ijzendoorn, Schuengel & Bakermans–Kranenburg, 1999; Olza-Fernández et al., 2014). Additionally, research exists linking aspects of the birth experience to maternal caregiving quality, which is predictive of infant attachment security (Bell et al., 2018; George & Solomon, 2008). The behavioral systems approach of understanding caregiving in relation to attachment will be discussed in a later section. However, no study of which the author is aware, has examined maternal birth experience holistically, including both objective, subjective and linguistic aspects, in connection with mother-infant attachment.

NEUROHORMONAL BIOLOGY & ATTACHMENT

Research conducted over the past seventy years supports that mother-infant attachment is a consequence of complex neurobiological processes which are at their most powerful and determining around childbirth and the early postpartum period (Olza-Fernández, Gabriel, Gil-Sanchez, Garcia-Segura & Arevalo, 2014). In the latter half of the twentieth century, human attachment was considered in an etiological framework—as a mechanism of mammalian survival. Animal models provided insight into dampening effects on early attachment processes, notably mother-infant separation (Hofer, 1973). One of the first studies of this kind found that newborn rat pups show changes in autonomic, thermal, hormonal, and behavioral systems after being separated from their mothers, providing evidence for a complex system of biobehavioral regulators related to the attachment process (Hofer, 1973). The physiological and behavioral changes displayed by the rat pups, due to separation, matched the increase–decrease pattern predicted by Bowlby (1969), the father of attachment theory.

Neurobiological regulators involved in childbirth that are thought to set the stage for caregiving behaviors related to attachment include: oxytocin, steroid hormones, neurosteroids, prolactin, vasopressin, catecholamines and endorphins (Olza-Fernández et al., 2014). During childbirth, these all come together in a symphony, synchronized with the infant's neurobiological systems, termed the "neurohormonal cascade" (Olza-Fernández et al., 2014). The neurohormonal cascade of childbirth is commonly affected by routine obstetric care and postpartum practices of Western countries; Cesarean sections, intrapartum hormonal manipulations, preterm delivery, mother–infant postpartum separation and bottle-feeding instead of breastfeeding are posited to negatively affect the mother-infant attachment system via corruption of the neurohormonal cascade (see Figure 1, taken from Olza-Fernández et al., 2014).

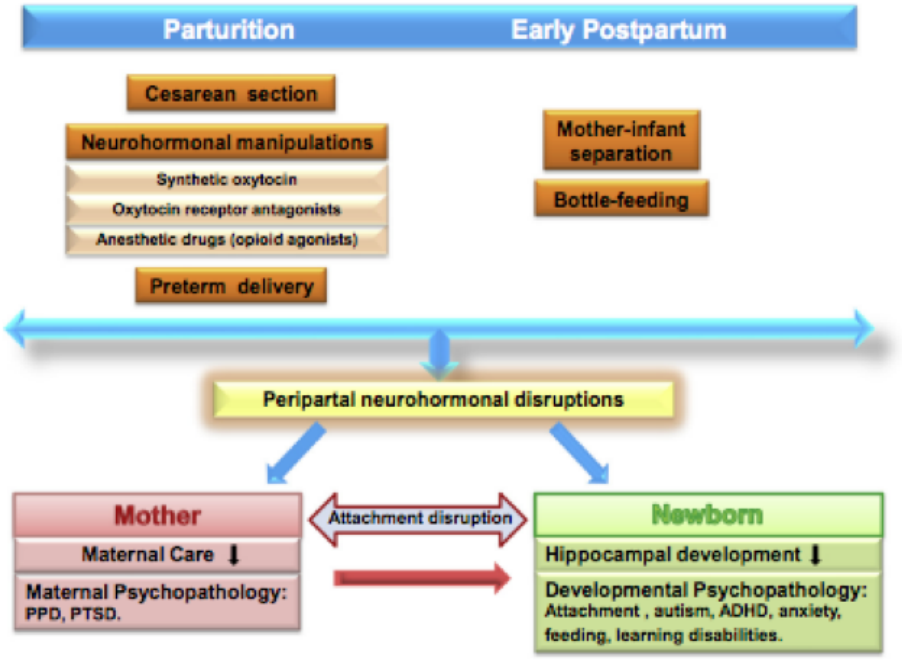

Figure 1: An etiopathogenic model of perinatal neurobiological disruption. This figure from Olza-Fernández et al. (2014) illustrates potential detriments to the neurohormonal cascade during the perinatal time period, which may disrupt the attachment system and lead to maternal and or child psychopathologies.

Oxytocin, perhaps one of the most well-known neuropeptides, is involved in feelings of gratification and love and plays a strong role in mammalian social bonding (Insel, 1992 & 1997). Oxytocin plays a key role in uterine contractions during childbirth labor, breast milk production, and the development of maternal behavior related to attachment such as feeling joy from being with the infant (Uvnas-Moberg, 1994; Carter & Altemus, 1997; Keverne & Kendrick, 1992). Natural, vaginal childbirths are related with healthy levels of oxytocin in the perinatal period (Odent, 2009); medical intervention in the forms of administration of drugs, manipulation of physical processes, and/or separation of the mother and infant in the hours after birth are known to negatively affect oxytocin levels (Olza-Fernández et al., 2014). Hence, disruptions in natural oxytocin during childbirth may affect early interactions of the mother and infant.

Cortisol, a steroid hormone, best known for its role in the stress response systems, unsurprisingly increases in mothers during childbirth (Ohana et al., 1996). However, it may be surprising to know that this increase in cortisol is positive and facilitates healthy maternal behavior (Krpan, Coombs, Zinga, Steiner & Fleming, 2005). For instance, the natural increase in cortisol during labor has been found to play a role in mothers' recognition and attraction to their baby's odor (Fleming, Steiner & Corter, 1997). If cortisol is not allowed to rise in its normal capacity during childbirth, it seems likely that it could be a potential vulnerability for maternal behavior towards her infant.

While mothers are experiencing this neurohormonal cascade, the fetus is experiencing its own synchronized cascade. The fetus' journey through the birth canal is known to compress the fetus' brain and cause stress, which is why it is termed "the stress of being born" (Lagercrantz & Slotkin, 1986). This journey and compression is known to kick-start the fetus' sympathoadrenal axis and activate the release of noradrenaline, cortisol and vasopressin (Wellman et al., 2010). These processes promote lung maturity via fluid reabsorption, increased blood flow, immune system functioning, metabolic functioning and the activation of the central nervous system (see Olza-Fernández et al., 2014 for a review). The "stress" of this journey is mended when the newborn infant receives vagal nerve stimulation through skin to skin contact with its mother as well as through breastfeeding (Ferber & Makhoul, 2004). Additionally, the fetus' neurohormonal cascade primes the olfactory (scent) system, which is important for the initiation of the infants' attachment behavior (Varendi, Porter & Winberg, 2002). Scent imprinting in newborns is the first method the infant uses to show preference for the primary caregiver (Gubernick, 1981). Medical interventions disrupting these neurohormonal processes in the infant have known effects. A study found that newborn infants who experienced uterine labor contractions, versus

those who did not (due most often to Cesarean delivery), performed better in their ability to learn and detect the first scent they were exposed to after birth (Varendi et al., 2002).

Further synchronization between the mother and infant occurs in the few hours after birth, or the "sensitive period". Mother-infant interaction during the sensitive period has been shown to be important in shaping the mother-infant attachment relationship (Mehler et al., 2011). This is likely due to the whole host of processes occurring between the mother and infant, including synchronized oxytocin releases which encourage parental responsiveness and reduced cortisol levels (Velandia, Matthisen, Uvnäs-Moberg & Nissen, 2010). In fact, the skin to skin contact during the sensitive period has been related to later infant emotion regulation, stress reactivity, metabolic adaptation, social and cognitive development and positive interactions between the mother and infant, perhaps indicative of the infants' attachment behavior (Bystrova et al., 2009, Velandia et al., 2010).

PERINATAL RISK & ATTACHMENT

Complications during pregnancy and childbirth negatively affecting the infant's physiology can have potentially direct influences on the attachment system by limiting the infant's ability to function normally, often cognitively, and thus engagement in attachment-related, bonding behaviors, such as breastfeeding and scent learning, may be hindered (López-Maestro et al., 2017; Waters, Vaughn & Egeland, 1980). Infants' perinatal anomalies can also affect the attachment system indirectly, via often correlated consequences of such complications, such as maternal postpartum depression, maternal feelings of guilt, inadequacy and/or inefficacy (Campbell et al., 2004; Huth-Bocks, Levendosky, Bogat, & Von Eye, 2004). These correlates may negatively impact maternal sensitivity or maternal mental ability to support security,

increasing the potential for an insecure mother–infant attachment (Teti, O'Connell & Reiner, 1996; Field, 2010).

Various studies have examined perinatal anomalies in relation to infant attachment, using the Strange Situation with mothers and their infants. There is a trend in the literature showing higher rates of insecure attachment in infants with perinatal risk (e.g., Apgar index, gestational age, weight, head growth, EEG, ultrasound, ventilation, etc.) and poor scores on neonatal behavioral assessments (Sprangler, Fremmer-Bombik & Grossman, 1996; Udry-Jørgensen et al., 2011; Waters, Vaughn & Egeland, 1980). Specifically, a study found full-term infants who spent time in the neonatal intensive care unit (NICU) had odds six times higher for developing a disorganized attachment at 36 months than similar infants without NICU experience (Pennestri et al., 2015). Neonates with poor behavioral orienting or intracranial hemorrhaging are also at greater risk for developing disorganized attachments as infants (Cox, Hopkins & Hans, 2000; Sprangler, Fremmer-Bombik & Grossman, 1996). Interestingly, there is inconsistency in the literature regarding premature and/or very low birth weight infants' likelihood of forming an insecure attachment. Several studies have found a link to insecurity for infants less than 1500 grams or less than 32 weeks (López-Maestro et al., 2017; Mangelsdorf et al., 1996), especially if they are separated from their mothers within 3 hours of their birth (Mehler et al., 2011) or have a low socioeconomic status (Wille, 1991).

Contrary to these findings, other studies have not found a link between perinatal risk and later infant attachment (Easterbrooks, 1989; Frodi, 1983). A meta-analysis on the topic found no link between perinatal risk status or prematurity and infant attachment (Korja, Latva & Lehtonen, 2012). The discrepancies in findings are likely a result of the discrepancy of perinatal risk between samples (i.e., infants under 2,500 grams are considered at low birth weight, while

those under 1,500 grams are at very low birth weight), socioeconomic status and other individual characteristics of the subjects in each dataset (Korja, Latva & Lehtonen, 2012). This study will examine prematurity in relation to infant attachment, in hopes of adding evidence to the literature.

In light of the strong evidence for early neurohormonal bases of mother-infant attachment behavior and the links from medical intervention and perinatal risk to infant attachment insecurity, the current study will examine the following birth experience risk factors: 1) delivery mode, 2) labor induction, 3) prematurity, 4) administration of pain medication, 5) place of birth, 6) intensive care treatment of the mother or infant, 7) separation of mother and infant immediate postpartum and 8) extended hospital stay of the mother and/or infant. Some of these birth risk factors will serve as proxy indicators for much of the research cited surrounding neurohormonal effects on maternal behavior and infant attachment.

Maternal Attachment Behavior

To the author's knowledge, there are no studies examining the holistic birth experience's link to dyadic, mother-infant attachment using the Strange Situation procedure. However, similar research exists studying aspects of the birth experience in relation to mothers' independent attachment representations of their infants (Benoit, Parker & Zeanah, 1997; Fonagy, Steele & Steele, 1991; Zeanah, Benoit, Hirshberg, Barton & Regan, 1994). Mothers' prenatal and early attachment representations of their infants are largely concordant with later mother-infant attachment as measured by the Strange Situation procedure (Benoit et al., 1997; Fonagy et al., 1991; Zeanah et al.,1994). Maternal representations of attachment with their infants and mother–infant interaction characteristics are negatively affected by premature birth (Evans, Whittingham & Boyd, 2012; Forcada-Guex, Borghini, Pierrehumbert, Ansermet & Muller-Nix, 2011). In

particular, mothers of premature infants often displayed a controlling dyadic pattern associated with high maternal post-traumatic stress symptoms and predicted distorted maternal representations (Forcada-Guex et al., 2011). Similarly, prematurity was found to predict negative maternal attachment representations, and mothers' avoidance of recalling the birth experience was found to account for a large part of the variance in attachment representation (Evans, Whittingham & Boyd, 2012).

Perhaps the most similar published study to the current, observed 46 mothers during birth and interviewed them about their birth experience (Peterson & Mehl, 1978). The data collected was analyzed in relation to observed dyadic mother-infant interactions coded for caregiving behavior, at 7 days, 1 month, 2 months and 6 months postpartum. Mothers with high attachment scores felt the baby was theirs soon after delivery, felt confident in caretaking, sought and maintained close contact to the baby, accepted caring for the baby without resentment or anger, responded to the baby's cries within 1-2 minutes, expressed mostly positive feelings about motherhood and interacted easily with the infant during the interview. The strongest association occurred between separation of mother and infant after birth and attachment behavior, with an inverse relation. A satisfactory birth experience was the next strongest predictor of positive attachment behavior. They also found that natural births compared to highly intervening hospital births were related to more satisfactory birth experiences and thus positive attachment behavior. Interestingly, mothers who reported being well prepared for birth with a definite birth plan were buffered from negative effects on attachment behavior, in the event that their birth plans did not go as expected (Peterson & Mehl, 1978). Early maternal attachment behavior, like early attachment representations, is predictive of later mother-infant attachment as measured by the Strange Situation procedure (Blehar, Lieberman & Ainsworth, 1977).

MATERNAL DEPRESSION & ATTACHMENT

The current study will examine maternal depression prenatally, at 8 months and 12 months postpartum, in order to determine trends in depression over the transition to parenthood. The literature shows mixed results on whether maternal depression affects infant attachment. Several meta-analyses on the topic found that depressed mothers are more likely having avoidant and disorganized infants (Atkinson et al., 2000; Martins & Gaffand, 2000; Hayes, Goodman & Carlson, 2013; Van Ijzendoorn, Schuengel & Bakermans–Kranenburg, 1999). However, a Dutch cohort study of close to 700 mothers found no relation between maternal depression and infant attachment (Tharner et al., 2012). Additionally, a recent systematic review of studies pertaining to perinatal maternal mental health and infant disorganized attachment found no link between low to moderate maternal depression and disorganization and an unclear relationship between chronic and/or severe depression and disorganization (Flowers, McGillivray, Galbally & Lewis, 2018). Why the wide discrepancies in study conclusions? Perhaps the interaction between timing and severity of maternal depression is an important variable in determining whether or not an infant will develop an insecure attachment.

Upholding this point, one study shows that timing of maternal depression during the perinatal period may be more indicative of negative effects on the mother-infant relationship than more simplified measures of depression (Laurent, Ablow & Measelle, 2011). Researchers examined the timing and course of maternal perinatal depressive symptoms on mother–infant HPA response profiles during a stress-inducing paradigm, as well as on within-dyad synchrony of stress profiles (individual coordination of HPA and sympathetic nervous system and dyadic infant–mother HPA attunement). The study measured maternal depression antenatally (T1), at 5 months postpartum (T2) and 18 months postpartum (T3), as well as mother-infant interaction

during a stress-response task at T3. Mothers whose depression trajectories significantly changed in severity from T1 to T3 had infants with more affected stress responses, with mothers going from high to low having infants with the lowest cortisol levels and those going from low to high having infants with the highest cortisol levels. Shifts from lower to higher symptoms predicted inverse coordination within the mother but greater attunement of mother-infant stress trajectories of the various maternal depression time points in relation to the strength between maternal birth experience and mother-infant attachment security (Laurent et al., 2011). Hence, it appears that trajectories of maternal depression may be more important than individual time points, with regards to negative effects on her infant.

In consideration of the evidence presented, it is hypothesized that increasing depression trajectories will predict mother-infant attachment insecurity.

The Maternal Birth Experience

Predictors of Maternal Birth Experience

Understanding the subjective maternal birth experience is important since it is predictive of maternal mental health in the postpartum and may define details recalled from the birth experience (Garthus-Niegel, von Soest, Vollrath & Eberhard-Gran, 2013; Waldenström, 2003). The maternal subjective birth experience is known to be affected by objective characteristics of the labor and delivery as well as individual differences (Smarandache, Kim, Bohr & Tamim, 2016). A meta-analysis of studies including delivery mode and birth experience found that delivering via Cesarean section, whether planned or not, was related to decreased breast feeding and negative birth experiences (DiMatteo et al., 1996). Delivering via Cesarean section has a negative influence on mothers' perceived control, emotions and first moments with her newborn (Guittier, Cedraschi, Jamei, Boulvain & Guillemin, 2014; O'Reilly, Choby, Séjourné & Callahan,

2014). Mothers who deliver via unplanned, emergency, Cesarean section fair worse overall, reporting feelings of failure, disappointment and embarrassment (Kjerulff & Brubaker, 2018). Related, feeling a lack of control during labor and delivery is predictive of poor satisfaction with the birth experience (Green & Baston, 2003; Lavender, Walkinshaw & Walton, 1999; Waldenström, Hildingsson, Rubertsson & Rådestad, 2004).

Individual differences are also responsible for shaping the subjective birth experience. From an attachment perspective, mothers who have a fear of losing their attachment figure and a poor sense of the perceived availability of those they are close to rate their birth experience more negatively (Reisz, Brennan, Jacobvitz & George, 2018). Expectations of the birth process, the relationship with caregivers and the spouse in the delivery room, privacy during birth and ownership of motherhood are all related to the subjective birth experience, regardless of mode of delivery (Guittier et al., 2014; Waldenström et al., 2004). Feelings of pain, lack of control, lack of attention given to the mother's concerns, lack of support during labor, and administration of obstetric analgesia are also all related to a more negative birth experience (Waldenström et al., 2004). Fortunately, a meta-analysis has found that maternal attitudes and behavior can buffer the negative effects of medical intervention on her birth experience satisfaction (Hodnett, 2002). Specifically, the four buffering factors related to birth experience satisfaction are: personal expectations, the amount of support from caregivers, the quality of the caregiver-patient relationship, and involvement in decision making. These four factors were stronger predictors than age, socioeconomic status, ethnicity, childbirth preparation, the physical birth environment, pain, immobility, medical interventions, and continuity of care, in regards to mothers' subjective birth experience assessments (Hodnett, 2002). In light of this, the variables of control and

support during childbirth will be included in the overall birth experience risk index which will be used in analyses in the current study.

MEASURING MATERNAL BIRTH EXPERIENCE

The standard and prevailing measurement for maternal subjective birth experience is a semi-structured interview format, including open-ended questions, related to evidence-based topics (Bell, Andersson, Goding & Vonderheid, 2018). A systematic review found that approaches capture similar information, such as overall satisfaction with caregiver and familial support and coping with pain and labor difficulty, as well as satisfaction with the birth in general (Bell et al., 2018). The same review concluded that the most opportune time to measure subjective birth experience is *after* the first three postpartum months; earlier measurements of birth experience are likely to be biased in favor of a positive birth experience due to the new mother "honeymoon phase" and maternal motivation to maintain positive relationships with their obstetric care physicians. Maternal subjective birth experience has been measured reliably with studies utilizing retrospective measures up to 24 months postpartum. Additionally, a study of 269 mothers interviewed between 4 weeks to 12 months postpartum found no moderating effect of infant age on the relationship between mode of delivery and birth experience or birth experience and maternal descriptions of their infants or maternal efficacy (Reisz, Jacobvitz & George, 2015). A study comparing birth experience assessments from about 2,000 mothers at 2 months versus 1 year postpartum found that 60% gave the same assessment, 24% were more negative and 16% were more positive (Waldenström, 2004). Those who increased in negativity were marked by painful labor and cesarean sections, dissatisfaction with intrapartum care, or psychosocial issues (depression, prenatal worry about childbirth, etc.), in comparison to those who decreased in negativity. Thus, it was concluded that a honeymoon phase exists at two

months postpartum in which negative factors of the birth are mentally muted by mothers (Waldenström, 2004). The current study captures mothers' birth experiences in a semi-structured interview format around 12 months postpartum. A retrospective report of birth experience is salient to the current study as it assesses the mother's current feelings and understanding of her birth experience, which is likely a better indicator of her current behavior and relationship with her infant.

LINGUISTIC ASSESSMENT OF THE BIRTH EXPERIENCE

Linguistic speech patterns offer an opportunity to examine the sub- or unconscious mind; regardless of whether the mother expresses a positive or negative view of her birth experience, her speech patterns may tell a different story. The linguistic pattern of nonfluency is known to relate to feelings of post-traumatic stress, anxiety and/or depression.

Researchers have examined linguistic patterns in relation to recall of past traumatic experiences and it is understood that there are clear, apparent discrepancies in speech related to trauma, including increased nonfluency (see Zoellner & Bittenger, 2004 for a review). Nonfluency has also been observed to increase in mothers who show more negative affect and less positive affect, over the transition to parenthood (De Choudhury, Counts & Horvitz, Feb. 2013) and is part of a screening tool used to identify mothers at risk for postpartum depression (De Choudhury, Counts & Horvitz, May 2013). Mothers who have postpartum stress disorder and/or postpartum depression have different patterns of speech than typical mothers (Ayers, Radoš & Balouch, 2015; Santoro, Stagni-Brenca, Olivari, Confalonieri & Di Blasio, 2018). Specifically, the usage of nonfluencies (i.e., "um", "uh", etc.), which are related to incoherence, were more frequent in the transcripts from mothers suffering from postpartum stress and/or depression (Ayers et al., 2015; Santoro et al., 2018). In turn, one study to examine postpartum

stress and found it to be related to controlling behavior in mother-infant dyad and distorted maternal representations of the infant (Forcada-Guex et al., 2011); other studies have found links between post-traumatic stress disorder and infant disorganization (Enlow, Egeland, Carlson, Blood & Wright, 2014). Mothers suffering from post-traumatic stress disorder, especially symptoms of avoidance and emotional numbness, have increased maternal psychopathology and parenting deficits (Ammerman, Putnam, Chard, Stevens & Van Ginkel, 2012). Hence, the current study will utilize a linguistic examination of nonfluency in mothers' speech as a proxy for any trauma or unresolved feelings of stress they may have related to their birth experience.

A study interested in the relation between maternal speech patterns prenatally and subsequent mother-infant attachment at 12 months postpartum analyzed maternal responses to Rorschach ink blots for primary process integration, which captures the "mother's capacity to freely, flexibly, and coherently access and communicate unconscious derivatives of affectively charged experience and her child's sense that she is emotionally available when the child is stressed" (Frank et al., 1994; p.476). High primary process integration was in turn significantly and positively related to infant attachment security at 12 months (Frank et al., 1994). Similar coherence-related speech patterns identified by linguistic analysis software have been found to be in 71% agreement with participants' coded coherence scores from the Adult Attachment Interview (Cassidy, Sherman & Jones, 2012). Postpartum mental health issues, maternal coherence of speech related to childbirth and maternal coherence of mind with respect to attachment are variables which contribute to predicting mother-infant attachment (Lyons-Ruth, Yellin, Melnick & Atwood, 2005; Forcada-Guex, Borghini, Pierrehumbert, Ansermet & Muller-Nix, 2011; Frank et al., 1994; Fonagy, Steele & Steele, 1991). Thus, understanding mothers'

nonfluency with regards to her birth experience, may be provide insight into the mother-infant attachment relationship.

The current study will seek to test whether this nonfluency accounts for any of the variance in mother-infant attachment security, above and beyond that of birth experience risk index and trajectory of depression over the transition to parenthood. An aim of this dissertation is to understand how nonfluency compares to the other predictors, since it has the potential to be an easy and accurate measurement clinicians can use to flag patients for intervention. Linguistic analysis allows for eradication of participant response bias while also eliminating a large portion of researcher error, since linguistic analysis software can handle complex word counts and pattern detection. This makes it an accurate and relatively easy tool for clinicians to use when determining whether or not a patient requires intervention.

BIRTH EXPERIENCE & CAREGIVING

Mother-infant attachment quality is the main outcome variable of interest in the current study, but there have been no studies published linking the holistic birth experience and mother-infant attachment from which this literature review can draw on. However, it is established that the attachment system evolved in unison with the caregiving system (Bowlby, 1969/1982, 1973) – maternal caregiving quality is highly predictive of mother-infant attachment (see van Ijzendoorn, 1995 for a review). Additionally, caregiving observations have been linked to birth experience (see Bell et al., 2018 for a review). Hence, evidence for a relationship between birth experience and maternal caregiving behavior is helpful to consider when hypothesizing potential effects of birth experience on mother-infant attachment.

Recently, a systematic review was published examining the birth experience's influence on maternal caregiving, including all relevant studies conducted over four decades (Bell et al.,

2018). Almost all studies included show a trend for satisfactory birth experiences to be indicative of later positive maternal caregiving attitudes and behaviors (Bell et al., 2018). Furthermore, the relationship between mode of delivery and maternal descriptions of their infants and self-esteem are moderated by subjective birth experience (Reisz, Jacobvitz & George, 2015). Additionally, a study done on the same data set as the current, found the subjective birth experience moderated the effect of maternal adult attachment on caregiving at 8 months postpartum (Sweeden-Yates, 1995). A negative birth experience is also predictive of the development of postpartum stress disorder and/or depression, especially when trauma occurred during childbirth (Ayers & Pickering, 2001; Righetti-Veltema et al., 1998) and these mental health issues are related to low responsiveness and sensitivity in caregiving (Lovejoy, Graczyk, O'Hare & Neuman, 2000). Using a behavioral systems approach to understanding the caregiving system provides the framework that caregiving behaviors are goal-corrected, governed by biological feedback and interact or compete with other behavioral systems (George & Solomon, 2008). Hence, maternal caregiving is susceptible to mothers' perceptions of negative feedback, tied to maternal self-efficacy, which may occur when the birth experience is suboptimal (Campbell et al., 2004; Huth-Bocks, Levendosky, Bogat, & Von Eye, 2004). Maternal caregiving is likely a mechanism through which factors related to the birth experience may affect the mother-infant attachment system.

According to the systematic review, studies were found to be in agreement that many factors of maternal caregiving may be influenced by the birth experience. The review also uncovered a few potential biases in the literature, a main one being the failure to control for maternal mental health in many of the studies (Bell et al., 2018). The current study will include

depression over three time points across the transition to parenthood to mitigate potential biases as well as to understand the relationship between depression & birth experience.

Attachment Theory

The main outcome of interest in this study is infant attachment to the mother. Infant attachment is founded in attachment theory and informed by evolutionary theory. It was pioneered by John Bowlby (1969), who theorized that attachment security develops through interactions with early caregivers who are available and supportive in times of need, increasing the infant's chance of surviving. Although usually stable throughout life, there is evidence that one's attachment representations are alterable and that interfering events may enact transformations (Booth-LaForce et al., 2014). Nonetheless, infant attachment, measured as young as 12 months, has been shown to have important implications for later life functioning—from the realms of physical and mental health to adult relationships and sociability (Puig et al., 2013; Styron et al., 1997; Lyons-Ruth et al., 1999).

History

During the turn of the twentieth century, psychoanalyst John Bowlby became inspired by the emergence of ethology, which paved the way for his creation of the theory of attachment. Specifically, Bowlby worked closely with Konrad Lorenz and Niko Tinbergen (two researchers who received the Nobel Prize in Physiology and Medicine for their work in ethology in 1973) and Robert Hinde (author of Animal Behaviour: A Synthesis of Ethology and Comparative Psychology (1966), a groundbreaking work that integrated psychology and ethology). Bowlby's goal, in his own words, became to "rewrite psychoanalysis in light of ethological principles" (Dinnage, 1979, p. 325).

In his first work published on attachment, Bowlby (1969) addressed each of Tinbergen's "four whys", or four ways to explain animal behavior (evolution, causation, function, and ontogeny) and how they adhere to human attachment. Coining the concept "environment of evolutionary adaptedness", Bowlby answered Tinbergen's "why" of evolution, explaining that in their environment of adaptedness humans had to be equipped with instinctive behavioral systems to be able to cope with the dangers of predators or aggressive members of their own species. The behavior that ensures a tight bond between mother and child evolved into instinctive behavior as a result of natural selection; children attach themselves to their caregivers because of the survival value in man's environment of evolutionary adaptedness. Bowlby answered the why of causation via human hormone levels, the organization and autonomous action of the nervous system, and environmental stimuli, as the activators or terminators of instinctual behavior. For the why of function, Bowlby explained, "the function of a biological system is that consequence of the system's activity which led to its having been evolved" (1969; p. 127). Finally, for the why of ontogeny, Bowlby described the instinct of attachment behavior as beginning in a primitive form and developing in complexity.

INFANT ATTACHMENT

Bowlby theorized that attachment security develops through interactions with early caregivers who are available and supportive in times of need, increasing the infant's chance of surviving (1969). Infants internalize this early relationship which then provides them the security needed to explore their environment and develop greater emotion regulation skills, and later, the capacity to care for others (Bowlby, 1973). Hence, attachment security is thought to promote positive models of the self and others that are internalized in the form of mental representations and affect future relationships (Bowlby, 1980). As a result of receiving sensitive and supportive

care, secure infants develop an internal working model of others as loving and of the self as worthy. The internal working model is developed early in childhood and is carried with one throughout life and contributes to personal relationships along the way.

Classifying Attachment

Mary Ainsworth worked with Bowlby, during the 1950s and 60s. In the mid 1950s, Ainsworth traveled to Uganda to study infant weaning practices, but found the patterns of infant behavior associated with proximity-seeking to the mother to be most fascinating (1967). During Ainsworth's time in Kampala, Uganda, she studied all 28 infants in the village, visiting 26 of them at least 10 times, with a median of 23 visits over a period of up to 9 months. The naturalistic observation, systematic rating scales, and antecedent-consequent hypotheses testing used in her methodology make Ainsworth's Ugandan work a landmark in cross-cultural research. Ainsworth gained rapport with mothers in Kampala and would spend hours visiting each mother and sitting in their living rooms, where the mother would be busy engaged in tasks around the home and the infant would usually be on the floor entertaining him or herself. Ainsworth realized specific infant patterns of proximity-promoting signals and behaviors, noting carefully when these signals and behaviors became preferentially directed toward the mother. Ainsworth categorized the Ugandan infants into three attachment patterns: "securely" attached infants cried little and seemed content to explore in the presence of mother; "insecurely" attached infants cried frequently, even when held by their mothers, and explored little; and "not-yet" attached infants manifested no differential behavior to the mother (1967).

After her work in Uganda Ainsworth moved to Baltimore, Maryland, where she undertook a similar study with 26 mothers and their infants, in an attempt to examine her attachment patterns in American infants (Ainsworth & Wittig, 1969). Ainsworth recruited

mothers prenatally and spent 4 hours in each home of the mothers and infants she studied, at each of 18 visits over the course of 54 weeks, in order for mothers to feel comfortable and act as naturally as possible. Ainsworth witnessed the same patterns originally observed with Ugandan infants, and thus began her creation of a measure of infant attachment later known as the "Strange Situation" procedure (Ainsworth, Blehar, Waters & Wall, 1978).

The Strange Situation

Bowlby and Ainsworth described the infant as being biologically predisposed to use the caregiver as a "haven of safety" and as a "secure base" while exploring the environment. The intricate balance between exploration and seeking proximity to the caregiver, when exploration proves threatening, is when individual differences in infants are most easily seen (Ainsworth et al., 1978; Bowlby, 1969/1982). Hence, assessments of attachment security in infancy are related to such secure-base behavior.

Parent-infant attachment is measured by the Strange Situation Procedure (SSP; Ainsworth et al., 1978). The procedure usually takes place in a laboratory setting and consists of eight three-minute intervals of separations and reunions between the parent and the child in order to assess how the child reacts to mild to moderate stress. The separations and reunions are designed to be increasingly stressful in order to elicit infant attachment behavior. The infant's ability to gain comfort in the mothers' presence during the reunion phases and to use the mothers as a secure base from which to explore determine the infant attachment classification. Based on this series of interactions, infants are assigned to one of four major classifications: secure, anxious avoidant, anxious resistant, or disorganized. Additionally, in the rare instance that the infant shows no obvious attachment strategy they are given the label "cannot classify".

Secure Attachment

Infants whose mothers responded appropriately and consistently during the first year of life come to trust their mother will be available when they are distressed. Infants are classified as secure in the Strange Situation if they are calmed by the contact and comfort they receive from the parent, allowing them to return to play following distress (Ainsworth et al, 1978). A secure attachment relationships promote infants' exploration of the world, since they are able to rely on a secure base, and expand their mastery of the environment. If the environment becomes unsettling, they can rely on their caregivers to be there to alleviate their fears (Bowlby, 1973).

Secure infants fare best in terms of future development (at least in Westernized, industrial cultures). Securely attached infants show more positive emotion and less anxiety in early childhood and have an easier time establishing relationships with teachers and peers at school, compared to those otherwise classified (Sroufe, 2005).

Avoidant Attachment

Infants whose mothers frequently rejected them when the infants sought contact come to believe their mothers will not be available when needed and develop an anxious-avoidant attachment relationship. The caregivers of avoidant infants have been described as rejecting, intrusive, controlling, and insensitive. Anxious-avoidant infants learn to ignore the mother and reject her attention in unfamiliar situations rather than to use her as a secure base from which to explore (Solomon & George, 1999). Physiological evidence collected in laboratory settings shows these infants experience negative feelings in relation to their mothers' unavailability, and avoiding their mother allows them to circumvent these feelings (Ainsworth et al., 1978).

Avoidant children appear needy to their teachers as they draw close during quiet times in order to gain attention. They are otherwise self-isolating, not initiating much in the way of

contact with peers, and the friendships they do have are characterized by exclusivity and avoidance of contact with other children (Sroufe, 2005).

Resistant Attachment

Having experienced inconsistent or intrusive caregiving over the first year of life, infants classified as anxious-resistant show angry, anxious and resistant behavior upon reunion with their mothers. Caregivers of resistant infants are insensitive to signals (e.g., crying) but not notably rejecting (Stayton, Hogan & Ainsworth, 1971). These infants mingle proximity- and contact-seeking with angry behavior and seem unable to be comforted and calmed by their caregivers (Lyons-Ruth & Jacobvitz, 1999). They are conspicuously unable to use the caregiver as a secure base for exploration of the novel setting; the hallmark of this classification in most cases in seeking contact, then resisting contact angrily once it is achieved (Ainsworth et al., 1978).

Resistant children also appear needy to their teachers and parents, as they often seek contact and help for things that should be simple for them to handle on their own. However, resistant children are oriented toward peers, but ineffective in relationships. They hover near peer group as onlookers; their immaturity and quickness to become frustrated handicap their efforts to interact (Sroufe, 2005).

Disorganized Attachment

The disorganized attachment classification was not included in Ainsworth's original scale. Infants are coded for disorganization using the Main and Solomon 1990) disorganization or disorientation classification scheme. This classification describes the diverse array of previously unrecognized fearful, odd, disorganized, or overtly conflicted behaviors exhibited during SSP. Disorganized infants exhibit unorganized behavioral strategies characterized by

appearing apprehensive, crying and falling huddled to the floor in response to their parents' return following a brief separation, turning in circles while simultaneously approaching their parents, and a freezing of movement while exhibiting a trance-like expression ("frozen watchfulness") (Main & Solomon, 1986; Lyons-Ruth & Jacobvitz, 1999). Main and Hesse (1990) have proposed that these behaviors are a result of the infant being exposed to frightening and/or frightened behavior by a caregiver. Mothers haunted by past trauma(s), sometimes demonstrate "frightening behaviors" (e.g., speaking in a spooky, haunted voice) or appear frightened (e.g., gasping and quickly drawing away as the infant approaches) (Jacobvitz, Leon, & Hazen, 2006).

Disorganized attachment is the most disturbed kind of attachment in early childhood and those with a disorganized classification are at increased risk of developing a psychopathology in their lifespan (Lyons-Ruth, Bronfman & Atwood, 1999; see Lyons-Ruth & Jacobvitz, 2016 for a comprehensive review).

Consequences of Infant Attachment

The primary aim of this dissertation is to identify birth experience characteristics that can forecast later mother-infant attachment quality. This would allow clinicians to mitigate negative trajectories in the mother-infant relationship as they begin, and catch them while mothers are under the "surveillance" of medical staff during the perinatal period. Mother-child attachment, measured during infancy, is a moderately stable indicator of later, adult attachment representation (Fraley, 2002; Waters, Weinfield & Hamilton, 2000). Stable, responsive, and nurturing caregiving early in life is also associated with better physical and mental health, fewer behavior problems, higher educational achievement, more productive employment, and less involvement with social services and the criminal justice system in adulthood (Heckman, 2007;

Schweinhart et al., 2005). Thus, understanding the implications of birth experience on infant attachment can have life changing potential.

The Current Study

Design

The current study will employ a sequential explanatory mixed methods design in order to investigate the implications of the maternal birth experience and maternal depression symptoms at three time points (prenatally, 8 months, and 12 months postpartum) on mother-infant attachment. A sequential explanatory design consists of primary quantitative work, to test hypotheses, and secondary qualitative work to expand on the results and elaborate on the research questions (Creswell & Plano-Clark, 2011). Mothers' responses to the birth experience interview items will be coded to capture the overall risk of her birth experience to provoke negative outcomes on the mother-infant relationship. The transcripts of the maternal birth experience interviews will also be analyzed in terms of linguistics; linguistic analysis software will be used to count the number of nonfluency utterances in order to determine mothers' nonfluency. The depressive symptom scores from all three time points over the transition to parenthood will be examined in terms of the trajectories which emerge in the sample. Lastly, mother-infant attachment will be assessed at 12 months postpartum, using the gold standard, the Strange Situation procedure (Ainsworth et al, 1978).

Birth experience transcripts will be analyzed qualitatively after the results from the quantitative phase of analysis have been analyzed. Based on the findings and whether or not hypotheses were supported, specific case studies may be examined in order to determine thematic patterns underlying trends. Transcripts will also be qualitatively analyzed through a thematic framework methodology with the following steps: 1) familiarization of the data, 2)

identification of a thematic framework, 3) indexing, 4) charting and 5) mapping and interpretation.

RESEARCH QUESTIONS & HYPOTHESES

Phase 1: Quantitative

Research Question 1

How does change in depression over the transition to parenthood, aspects of mothers' recalled birth experiences and mother-infant attachment relate to one another?

Hypothesis 1

Increases in depression, maternal birth experience risk, nonfluency and insecure and disorganized infant attachment will be correlated with one another.

Research Question 2

Does a negative maternal birth experience interact with nonfluency in recall to predict mother-infant attachment?

Hypothesis 2

Maternal birth experience risk will interact with nonfluency to predict insecure and disorganized infant attachment above and beyond change in depression over the transition to parenthood.

Phase 2: Qualitative

Research Question 3

Which underlying themes and typologies in mothers' recalled birth experiences help explain why some mothers differ from the norm in terms of either their birth experience,

depression trajectory, and/or mother-infant attachment security? Do case studies reveal important differences?

METHODOLOGY

Participants & Recruitment

The current study follows 44 mothers and their first-born infants over the transition to parenthood, including data gathered at three waves: prenatally, at 8 months and at 12 months postpartum. The sample is part of a larger, longitudinal study conducted (Jacobvitz, Hazen, Curran, & Hitchens, 2004; Riggs & Jacobvitz, 2002). Mothers were recruited during the third trimester of pregnancy from birthing classes, public service radio announcements, newspaper press releases, and flyers distributed at maternity stores within the greater Austin area. To ensure a representative sample, mothers were recruited from birthing classes at hospitals serving indigent populations as well as those serving middle class families. Moreover, about half the sample was recruited from small classes in rural areas that were not associated with a hospital. Finally, 15% of the sample responded to public service announcements advertising that participants would be paid for their participation.

The subset of 44 mothers from the larger sample who answered calls for birth experience interviews did not differ significantly from the rest of the sample in educational attainment or family income. Mothers ranged in age from 22 to 43 years (M = 31). The large majority were White (91%) and the rest were Hispanic (7%) or African American (2%). The median family income was $30,000 – $45,000. Income level varied widely, with 16% reporting family earnings around the poverty level (according to defined poverty levels for families of 3 in 1996; ASPE, 2018) and 20% reporting earning above $60,000. Most had at least some college education (86%).

In return for their participation in the study, each family received a $50 savings bond for their child at the completion of each of the three phases of data collection (for a total of $150 in

savings bonds), bimonthly project newsletters, a T-shirt for their infant, and an audiotape of lullabies. At the end of the study parents were sent copies of the videotaped interactions with their child.

Procedure

The data that will be used in the present study were collected in the first three waves of the larger longitudinal project, which included seven sessions of data collection. Mothers were visited at home, during the first, prenatal, and second, 8 months postpartum, waves. Mothers completed consent forms and several questionnaires to capture their demographic status along with stress, depression and anxiety levels. At 12 months postpartum, mothers and their infants visited the university laboratory for the third wave of data collection. During this visit, mothers were observed interacting with their child in The Strange Situation paradigm (Ainsworth et al., 1978) order to assess the attachment relationship between the mother and infant. The same questionnaires given in previous waves were administered again for mothers. Additionally, around 12 months postpartum, mothers were called on the telephone and interviewed about their birth experiences.

Measures

Demographics

At each data collection wave, mothers were asked to provide information regarding their family income.

DEPRESSION

At each data collection wave, mothers rated their current depressive symptoms via the Center for Epidemiological Studies' Depression Scale (CES-D; Radloff, 1977). The CES-D includes 20 items comprising six scales that reflect the major dimensions of depression: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. High internal consistency has been reported with Cronbach's alpha coefficients ranging from .85 to .90 across studies. Concurrent validity by clinical and self-report criteria, and substantial evidence of construct validity, have been demonstrated (Radloff, 1977). The CES-D was selected for the current study because it is one of the best known and most widely used measures of depressive symptomatology in the general population (Hunter et al., 2003).

The current study planned to analyze three maternal depression time points, as measured by the CES-D, over the transition to parenthood: during pregnancy, at 8 months postpartum and at 12 months postpartum. The CESD was not available at 12 months, so two time points (prenatal and 8 months) were used. Instead, depression trajectory scores were created by subtracting prenatal depression from depression at 8 months postpartum. Individual time points were also examined in relation to other variables.

BIRTH EXPERIENCES

Aspects of mothers' objective and subjective birth experiences were captured in phone interviews. The semi-structured interview was designed based on empirical data and includes 26 items (see Appendix A; Sweeden-Yates, 1995). The first 13 items are objective in nature and assess medical and physical health factors of the labor and delivery. They are intended to help mothers place themselves within the context of their childbirth experiences and include questions

like, “Where was your baby born?” and “What type of delivery did you have?” (Sweeden-Yates, 1995). The second half of the items are subjective in nature and assess mothers’ perceptions of aspects of their labor and delivery. Specifically, the latter 13 items ask mothers to rate their various perceptions on a Likert scale or to give a “yes” or “no” response and justification are given for both rating/response styles. Examples include, “Please rate the extent to which you felt supported by your partner?” and “Did you feel that you were well prepared for childbirth?”

Preparation for Analysis

Linguistic Analysis

The original audio-taped interviews were transferred from micro-cassettes to digital MP3s and transcribed by a team of undergraduate research assistants working on the current study. Next, the transcripts were prepared for usage with a Linguistic Inquiry and Word Count Software (LIWC2015; Pennebaker, Booth, Boyd & Francis, 2015). This included removing interview questions and responses relating to the chosen Likert scale scores, from interview items asking participants to rate various aspects. This left simply the participant’s discussion of the various topics corresponding to the interview items in the transcript. LIWC will be used to count nonfluency words or utterances. Nonfluency words or utterances include any breaks (i.e., stuttering and words or a train of thought cut-off), irregularities or non-lexical vocables (i.e., um or ugh), and repaired utterances (i.e., correcting mispronunciation).

Risk Index Coding Scheme

A coding scheme to capture the level of risk in mothers’ birth experience was devised to serve as a risk index for what the literature has found to be linked to negative outcomes in the mother-infant relationship. Following the risk index methodology of Sameroff, Seifer, Barocas, Zax and Greenspan (1987), each risk aspect was chosen based on the criteria that there was a

significant basis in the literature validating the variable's potential negative impact on relevant outcomes, that they were mutually exclusive, and that the variable is reliable (reliability will be tested during coding). The literature supporting the following risk aspects chosen is discussed and cited in the first two chapters of this dissertation. In total, 11 potential aspects of risk during childbirth were found in the current study's birth interview transcripts. These include: 1) delivery mode, 2) labor induction, 3) prematurity, 4) administration of pain medication, 5) place of birth, 6) control over the birth process, 7) support from medical staff and family, 8) intensive care treatment of the mother or infant, 9) separation of mother and infant immediate postpartum, 10) extended hospital stay of the mother and/or infant and 11) feelings of postpartum depression. These 11 risk variables and corresponding codes are listed in Appendix B.

Each of the 11 aspects were rated on a Likert scale from 1 – 4, with higher scores indicating more risk. Some codes corresponding to the aspects of risk will be weighted relative to the amount of evidence in the literature for the risk aspect to be predictive of negative outcomes. For example, the risk variable of "place of birth" has the following codes: home = 1, birthing center = 2, taken to hospital during birth = 3, hospital = 4. The variable of intensive care treatment was categorical in nature and thus a Likert scale rating of risk was not possible so the possibilities were set at opposite ends of the scale (i.e., no intensive care = 1 and mother/infant received intensive care = 4). The variables more continuous in nature (i.e., control and support) were given codes to fit on a 4 point Likert scale as to have the same overall weight in the risk index as the other variables (see Appendix B). All variables were felt to have similarly evidenced links to negative outcomes in the mother-infant relationship, based upon the literature review.

Interrater Reliability

The process of achieving interrater reliability for the birth experience risk indices followed Hruschka et al.'s outline for coding open-ended interview response data (2004). The general order of steps is: 1) the segmentation of text, 2) codebook creation, 3) coding, 4) assessment of reliability, 5) codebook modification, and 6) final coding—with coding, assessment of reliability, and codebook modification perhaps conducted several times in iteration. Segmentation of the transcript texts culminated in the identification of meaningful units of text, or "segments". For instance, the recurring trend of mothers giving examples of instances when their doctor or nurse staff did not honor their decisions or wishes led to the definition of the coding criteria for the risk variables of control during childbirth (see Appendix B). Along with four undergraduate researchers the transcripts were combed to be sure the codes are in fact relevant and found in all transcripts. The next step, coding, included a random sample of 20% of the interviews, which were coded by myself and three other undergraduate researchers, from which reliability scores were determined. Reliability scores were analyzed using intra-class correlation (ICC) tests. ICC is suitable for assessing interrater reliability for ordinal, interval, and ratio variables and for studies with two or more coders when all subjects in a study are rated by multiple coders (Hallgren, 2012). If the ICC values fail to reach .75 and thus reliability isn't reached (ICC value cutoffss: $< .40$ = poor; .40 - .59 = fair; .60 - .74 = good; .75 - 1.0 = excellent), differences in ratings were to be conferenced and the coding scheme may be modified if necessary. Thereafter, a subsequent random subset of 20% of the transcripts would be coded independently by all four coders and the process to reach reliability would repeat. Once reliability was reached, all transcripts were rated by myself and three undergraduate research

assistants. When all participants are rated by the same set of multiple coders, it is known as a fully crossed design, which provides more power in following analyses (Hallgren, 2012).

ATTACHMENT CLASSIFICATION

The mother-infant attachment classifications were assessed at wave three using the Strange Situation Procedure (Ainsworth et al., 1978), when infants were between 12 and 15 months old. The Strange Situation is a laboratory procedure consisting of eight three-minute intervals of separations and reunions between the mother and the child in order to assess how the child reacts to mild to moderate stress. The separations and reunions are designed to be increasingly stressful in order to elicit infant attachment behavior. The infant's ability to gain comfort in the mother's presence during the reunion phases and to use the mother as a secure base from which to explore determine the infant attachment classification.

Preparation for Analysis

Based on this series of interactions, infants are assigned to one of four major classifications: secure, anxious avoidant, anxious resistant, or disorganized. The disorganized attachment classification was not included in Ainsworth's original scale. Infants were coded for disorganization using the Main and Solomon (1990) disorganization/disorientation classification scheme. Infants classified as secure have mothers who responded consistently to their needs. They are easily comforted and explore confidently, in their mothers presence, in an unfamiliar situation. Anxious avoidant infants had mothers who frequently rejected them when the infant sought contact. They later tended to avoid their mothers as a way of avoiding the feelings they experienced in relation to their mothers' unavailability. Anxious resistant infants experienced inconsistent or intrusive caregiving. They showed angry, resistant, and resistant behavior upon reunion with their mothers. They appeared to experience and display both anxiety and anger

toward their mothers. Disorganized attachment refers to attachment bonds in early childhood that are characterized by an overall lack of organized attachment strategy. Infants are classified as disorganized/disoriented have experienced a frightening type of caregiving from their attachment figures. Disorganized attachment is a temporary breakdown of secure or insecure attachment strategies, when the child is faced with two incompatible sources of fright: a stressful and threatening situation combined with a frightening adult who is the only attachment figure available to provide relief. The Strange Situations were videotaped and coded by two independent experienced coders. Reliability between the two coders was .92. A third coder was used for any tapes that were ambiguous or produced inter-rater disagreements.

Data Analyses

Using a sequential explanatory mixed methods design, the current study hoped to identify and explore the relation between aspects of the maternal birth experience, depression over the transition to parenthood and later mother-infant attachment. Mixed methods research began being accepted as a third research paradigm to answer complex research questions that call "for answers beyond simple numbers in a quantitative sense or words in a qualitative sense", in the American research community in the late 1980's (Creswell & Plano-Clark, 2011, p. 21). When designing a mixed methods study, there are different aspects to consider, including: a) the integration of quantitative and qualitative data through combining, building sequentially, or embedding the data sets; b) prioritization of one or both types of data depending on the research focus; c) implementation of procedures in a single study or multi-phase program of study; and d) framing of the procedures within philosophical and theoretical lenses (Creswell & Plano-Clark, 2011). For the current study, the integration of the data occurred sequentially in order for the qualitative analyses to be informed and shaped by the quantitative results. Additionally, because

the data used in the current study was previously collected, the implementation of procedures took place in a single study.

QUANTITATIVE

First, descriptive statistics are reported for all variables. The means, standard deviations, and ranges for both the childbirth risk index, nonfluency count and depression scores are reported. The frequency counts for mother-infant attachment classifications are reported and a Chi Square test of independence was performed to examine sample differences in regards to attachment classification frequencies reported in the meta-analysis by van IJzendoorn & Bakermans-Kranenburg (1996). Because of power issues related to having a small sample and dividing the sample into categories, analyses were run with classifications collapsed in either a secure or insecure group. The insecure group included the anxious avoidant, anxious resistant and disorganized. Additionally, analyses were run with classifications collapsed in either an organized or disorganized group. This is because of the relatively large amount research cited in the literature review that found aspects of the birth experience to be related specifically to infant disorganization. The organized group included the secure, anxious avoidant and anxious resistant classifications, while the disorganized group only contained the disorganized classification. Attachment classifications were dummy-coded in reference to the secure or organized group for use in all analyses.

Second, hypotheses were tested. The first hypothesis predicts increases in depression, maternal birth experience risk, nonfluency and insecure and disorganized infant attachment would be correlated with one another. A partial correlation matrix was run with all relevant variables and the covariate of family income prenatally.

The second hypothesis predicts the maternal birth experience risk would interact with nonfluency to predict insecure and disorganized infant attachment above and beyond change in depression over the transition to parenthood. To test this, a stepwise binomial logistic regression was run with the birth risk index, nonfluency, interaction term of birth risk and nonfluency, prenatal family income and change in depression as independent variables in reference to the binomial dependent variable secure versus insecure mother-infant attachment. Additionally, a second, identical stepwise binomial logistic regression was run, but instead it included the binomial dependent variable of organized versus disorganized mother-infant attachment.

The covariate of family income was included in all hypothesis testing analyses, as it is indicative of birth experience (Blumenshine, Egerter, Barclay, Cubbin & Braveman, 2010), depression (Kahn, Wise, Kennedy & Kawachi, 2000), and interacts with maternal depression to affect mother-infant attachment (Lyons-Ruth, Connell, Grunebaum & Botein, 1990). The statistical software SPSS 2013 by IBM, for use on Mac computers, was used for all descriptive analyses (IBM, Corp., 2013). To test hypotheses, the MPlus 6.0 software package was used to conduct analyses (Muthén & Muthén, 2015). MPlus has the ability to estimate missing data using a full information maximum likelihood technique (Allison, 2002; Enders, 2010).

QUALITATIVE

The maternal birth interviews were analyzed in terms of thematic topics, using the 5-step framework approach to qualitative analysis: 1) familiarization, 2) identifying a thematic framework, 3) indexing, 4) charting and 5) mapping and interpretation (Pope, Ziebland & Mays, 2006). Additionally, findings from the quantitative analyses allowed for multiple case studies to be highlighted in order to uncover explanatory trends. The process for analyzing multiple case studies followed Ivankova and Stick's (2007) framework: participants are purposefully selected

by the researcher using maximal variation sampling (a small number of units or cases that maximize the diversity relevant to the research question), their data is analyzed using coding and thematic analysis within and across cases and the results are integrated in the discussion of the study.

To become familiarized with the raw data, I immersed myself by listening to the interview recordings and reading the transcripts. This allowed me to begin to identify key ideas and themes (e.g., mothers' lack of control during childbirth). Second, I began to identify a thematic framework, indexing themes and categories surrounding particular phrases, incidents, or types of behavior. Indexing includes annotating the transcripts with identifiable codes. This generated sections of data that could be easily navigated for later needs. Next, charting was done in order to organize multiple participants' indexed responses, which fit under a key subject area or theme. For example, the theme of lack of control may have the indexed participant responses of "birth plan not followed", "unwished procedure administered", or "inability to manage pain" under it. Finally, mapping and interpretation took place: the range, nature and association of the themes were explored and typologies were created. The process of mapping and interpretation was influenced by the original research objectives as well as by the themes that have emerged from the data. The results from the qualitative analysis were interpreted along with the quantitative findings and in light of the study's research aims, questions and hypotheses.

RESULTS

The current study followed 44 mothers and their first-born infants over the transition to parenthood, including data gathered at three waves: prenatally, at 8 and at 12 months postpartum. Over this transition, maternal depression, birth experience and infant-mother attachment quality was assessed. This study utilized a mixed methods approach: maternal, self-reported, retrospective birth experience was analyzed both quantitatively and qualitatively. Due to audiotape quality, only 40 birth experience interviews could be coded for the entire birth experience risk scale. Thus, the study sample consists of 40 mothers and their infants.

Phase 1: Quantitative Results

DESCRIPTIVE STATISTICS

Maternal Depression

Depressive symptoms were assessed using the CES-D and a factor from the birth experience risk scale asked mothers to informally describe any symptoms of postpartum depression they remember feeling. Depression was measured using the CES-D, which provides scores of 0 – 60, with a score of 16 or greater delineating clinical depression (Radloff, 1977). Prenatally, 8 out of 40 (20%) mothers reached clinical cut-off scores for depression (≥16). At 8 months postpartum, 9 out of 40 (22.5%) mothers reached clinical cut-off scores for depression. When reporting informally on their retrospective memories of postpartum depression, 13 out of 40 (32.5%) mothers reported some feelings. Of those reporting symptoms, 5 (38.5%) mothers reported symptomology indicative of slight impairments on mood and daily functioning, 1 (7.7%) mother reported symptomology moderately affecting daily functioning and 1 (7.7%) mother reported symptomology severely affecting her daily functioning. The other 6 (46.1%) mothers reported relatively minor symptoms of which they were mostly able to cope with. Please

see Table 1 for the ranges, means and standard deviations of maternal depression scores. Additionally, see Appendix B for the coding scheme of postpartum depression symptomology.

A depression trajectory score was created to analyze increases or decreases in maternal depression over the transition to parenthood. The depression trajectory score was calculated by subtracting prenatal CES-D scores from CES-D scores measured at 8 months postpartum. Hence, a trajectory score of zero indicates no change in depression, a negative trajectory score indicates a decrease in depression and a positive trajectory score indicates an increase in depression. Mothers varied in their trajectories: 3 (7.5%) mothers showed no change in depression, 22 (55%) mothers decreased in depression and 15 (37.5%) mothers increased in depression (see Table 1).

Table 1.

Maternal Depression as measured by the CES-D and Retrospective Accounts

	Range	M(SD)
Prenatal CES-D Scores	3 – 31	11.25(5.76)
8 month Postpartum CES-D Scores	0 – 29	10.45(6.83)
Postpartum Depression Symptomology	1 – 4	1.45(.75)
Δ Depression	-25 – 21	-.80(7.96)

Note. Δ Depression = Depression trajectory created by subtracting prenatal scores from 8 month postpartum scores; $N = 40$.

Depression scores, from pregnancy and 8 months postpartum, were uncorrelated with one another. However, mothers' reports of postpartum depression symptoms were correlated with prenatal but not 8 month depression scores (see Appendix C).

Birth Experience Risk Scale

A coding scheme was created to assess the level of risk experienced by mothers during birth, with risk indicative of empirically derived characteristics related to birth which may negatively affect the mother-infant relationship. There were eleven risk factors included in the birth experience risk coding scheme: 1) delivery mode, 2) labor induction, 3) prematurity, 4) administration of pain medication, 5) place of birth, 6) control, 7) support, 8) intensive care treatment of the mother or infant, 9) separation of mother and infant immediate postpartum and 10) extended hospital stay of the mother and/or infant and 11) symptoms of postpartum depression. Despite the relatively small, less diverse sample of the current study, results from the coding scheme ranged the full spectrum for most of the scales (see Table 2). However, there was not enough relevant information in the birth experience interview responses to accurately code mother-infant separation in the immediate postpartum, so this factor was dropped. Additionally, no babies were born earlier than one week before their due date. Thus, none were considered to be premature and the prematurity risk factor was also dropped. The resulting birth risk index included a total of 9 factors.

Birth experience transcripts were coded by two undergraduate research assistants and the author for all 11 original birth experience risk factors (see Appendix B). The process of achieving interrater reliability for the birth experience risk indices followed Hruschka et al.'s outline for coding open-ended interview response data (2004). If the ICC values fail to reach .75, reliability isn't reached (ICC value cutoffss: < .40 = poor; .40 - .59 = fair; .60 - .74 = good; .75 - 1.0 = excellent). Initially, 6 transcripts were coded before calculating interrater reliability and conferencing scores for the first time. The first intra-class correlation coefficient (ICC) was .923 with a 95% confidence interval from .701 to .988 (F[5,10] = 13.00, p<.001). After conferencing, our final ICC was .966 with a 95% confidence interval from .867 to .995 (F[39,78] = 29.31,

$p<.001$). The factors in the birth experience risk coding scheme were coded so that higher scores indicate greater risk. The coding of early versus late administration of labor induction drugs was decided upon by mothers' explanations of why they received labor inducing drugs. For instance, some mothers arrived at the hospital before their water broke and were thus given labor inducing drugs early on, to speed things up, while other mothers experienced a plateau in contractions hours into labor and were then given labor inducing drugs to speed things up. The coding of early versus late administration of labor pain medication was decided upon by mothers' explanations as well. For instance, many mothers explained that they were hoping to "wait it out" and avoid labor pain medication as long as they could, opting in later in labor, while others explained that they received labor pain medication as early as they were allowed. Scores were averaged between three coders, so if there was a disagreement, a score with a decimal may be present. For ease of viewing, in Table 2 below, decimal scores and scores given in between risk units 1 – 4 (e.g. half points) were rounded up or down to put in their best fitting risk unit. However, the risk factors of control and support were very often given half point scores and thus averaging between coders created many score possibilities. Hence, the ranges, means and standard deviations are given instead for these variables. Please see Appendix B, for the full coding scheme.

Table 2.

Maternal Birth Experience Risk Factors

	N(%)	N(%)	N(%)	N(%)
1. Delivery Mode	Vaginal	Vaginal with Intervention	Planned Cesarean	Unplanned Cesarean
	21(52.5%)	11(27.5%)	3(7.5%)	5(12.5%)
2. Labor Induction	None	Late in Labor	Early in Labor	Planned from The Start
	19(47.5%)	5(12.5%)	10(25%)	6(15%)
3. Administration of Pain Medication	None	Late in Labor	Early in Labor	Planned from The Start
	7(17.5%)	8(20%)	22(55%)	3(7.5%)
4. Place of Birth	Home	Birthing Center	Taken to Hospital from Home/Center	Hospital
	1(2.5%)	3(7.5%)	5(12.5%)	31(77.5%)
5. Intensive Care	None		Mother and/or Infant	
	38(95%)		2(5%)	
6. Extended Stay	Never in Hospital	Typical Hospital Stay Length	1-24 Hours More Than Typical	24 Hours More Than Typical
	4(10%)	26(65%)	8(20%)	2(5%)
7. Control		Range	M(SD)	
		1 – 3.38	1.94(.75)	
8. Support		Range	M(SD)	
		1 – 3	1.71(.58)	
Total Birth Risk		Range	M(SD)	
		10 – 26.75	18.35(3.76)	

Note. $N = 40$; The birth risk factor of Postpartum Depression is not included in this Table as it is included earlier in Table 1.

Nonfluency during the Birth Experience Interview

Nonfluency was measured by LIWC (2015), in each of the mothers' birth experience transcripts. Nonfluency scores ranged from 1.36 – 6.54, with an average of 3.37 and standard deviation of 1.30.

Infant Attachment

Mothers and their infants participated in the Strange Situation (Ainsworth, Blehar, & Waters, 1978) at 12 months postpartum, in order to assess infant-mother attachment. Of the 40 mothers who have complete birth experience data, 2 did not participate with their infants in the infant attachment protocol and thus do not have attachment data. Thus, our sample total for examining infant attachment was 38 mother-infant dyads. Infants were classified as either secure, avoidant-ambivalent, anxious-resistant or cannot classify. If relevant, infants were also given a secondary classification of disorganized. For the purposes of this study, infants' attachment classifications were dummy-coded two ways: secure versus insecure and organized versus disorganized. A categorization of insecure includes avoidant-ambivalent, anxious-resistant, disorganized. A categorization of disorganized includes all with secondary disorganized classifications. Comparing the observed attachment classification frequencies from the current study to the typical frequencies seen in American, non-clinical infants (Van Ijzendoorn, Schuengel & Bakermans–Kranenburg, 1999), a Chi-Square analysis shows that our sample contains significantly different frequencies (X^2 [3, N = 38] = 9.35, p < .05; see Table 3).

Table 3.

Observed Infant Attachment Classification Frequencies versus Expected Frequencies

	A	B	C	D
Observed (N = 38)	4	17	6	11
Expected	5.6	23.4	3.4	5.6

Note. A = avoidant-ambivalent, B = secure, C = anxious-resistant, D = disorganized. Expected frequencies were calculated using American, typically developing infants' attachment classifications published in a meta-analysis (Van Ijzendoorn et al., 1999).

Correlations

Depression

Birth Risk

The summed, total birth risk of mothers' birth experiences was not related to any maternal depression time points or trajectory (see Appendix C).

Nonfluency

Mothers' self-reported, retrospective feelings of postpartum depression were positively correlated with nonfluency word frequency in birth experience transcripts (see Appendix C).

Infant Attachment

None of the measurements of maternal depression were correlated with infant insecure or disorganized attachment (see Appendix C).

Nonfluency

Birth Experience

No variables related to nonfluency in mothers' birth experience transcripts were correlated with the total birth experience risk (see Appendix C).

Infant Attachment

Nonfluency word usage was positively correlated with infant disorganized attachment, but not insecure (see Appendix C).

Birth Experience

Infant Attachment

The summed, total birth experience risk was not correlated with infant insecure or disorganized attachment (see Appendix C).

Interactions

The second hypothesis predicts the maternal birth experience risk would interact with nonfluency to predict insecure and disorganized infant attachment above and beyond change in depression over the transition to parenthood. A stepwise binomial logistic regression was run with the birth risk index z-score, nonfluency z-score, interaction term of birth risk and nonfluency (created with z-scores), prenatal family income and change in depression as independent variables in reference to the binomial dependent variable secure versus insecure mother-infant attachment. Additionally, a second, identical stepwise binomial logistic regression was run, but instead included the binomial dependent variable of organized versus disorganized mother-infant attachment.

The logistic regression examining the probability of insecure infant attachment showed good model fit, with no significant *p*-value, according to Hosmer and Lemeshow's test for binary model calibration error ($X^2(8) = 8.17$, $p = .417$). The log-likelihood of the new model in comparison with a baseline model explains marginally more of the variance ($R^2 = .31$) in outcome ($X^2(5) = 9.96$, $p = .076$). For every unit increase (standard deviation) in the interaction

term, the odds are about 6 times more likely that an infant will be insecure (see Table 4). Only when both birth risk and nonfluency were high, did the model predict insecurity. The calculated Press's Q showed the results exceed the classification accuracy expected by chance at a statistically significant level ($X^2(1) = 8.52$, $p < 001$). This model was accurately able to classify 73.7% of cases of insecure infant attachment.

The logistic regression examining the probability of disorganized infant attachment showed good model fit, with no significant *p*-value, according to Hosmer and Lemeshow's test for binary model calibration error ($X^2(8) = 4.03$, $p = .855$). The log-likelihood of the new model in comparison with a baseline model explains marginally more of the variance ($R^2 = .48$) in outcome ($X^2(5) = 15.80$, $p = .007$). For every unit increase (standard deviation) in nonfluency, the odds are about 5 times more likely that an infant will be disorganized, and 8 times more likely for each unit increase in the interaction (see Table 4). High nonfluency with moderate, but not low birth risk was also predictive of disorganization. The calculated Press's Q showed the results exceed the classification accuracy expected by chance at a statistically significant level ($X^2(1) = 8.52$, $p < 001$). This model was accurately able to classify 68.4% of cases of disorganized infant attachment.

It should be noted that with small sample sizes (i.e., $N < 50$), it is difficult to assess model fit for binary logistic regressions, and thus the results from the logistic regression should be interpreted with caution.

Table 4.

Summary of Multiple Binary Logistic Regressions Predicting Infant Attachment

	B	SE	OR	95% CI for OR	
Insecurity					
Prenatal Income	.13	.31	1.14	.622	2.09
Δ Depression	-.02	.05	.98	.90	1.08
Birth Risk	-.04	.45	.96	.40	2.31
Nonfluency	.59	.53	1.80	.64	5.06
Birth Risk X Nonfluency	1.78*	.77	5.91	1.30	26.75
Disorganization					
Prenatal Income	-.45	.39	.64	.30	1.37
Δ Depression	.07	.05	1.07	.97	1.19
Birth Risk	.52	.56	1.67	.56	4.98
Nonfluency	1.61*	.75	5.02	1.17	21.66
Birth Risk X Nonfluency	2.07*	1.00	7.91	1.10	56.58

Note. Birth risk and nonfluency are z-scored and the interaction term uses the z-scores; OR = odds ratio; SE = standard error; CI = confidence interval; *$p < .05$.

Exploratory Analyses

Correlations between Study Variables

After finding that birth risk was uncorrelated with all variables in the current study, it was of interest to determine whether there were individual risk factors that were. Hence, each birth risk factor was entered into the Pearson partial correlation matrix, along with depression scores, nonfluency and infant attachment insecurity and disorganization, with prenatal family income as the covariate (see Appendix C).

Depression

Mothers' depression trajectories over the transition to parenthood were marginally related to the administration of pain medication, such that earlier administration of pain medication was indicative of increasing depression. Maternal control during labor and labor induction were both

marginally related to fewer postpartum depression symptoms. Earlier administration of pain medication was marginally related to increased depression trajectories, over the transition to parenthood. Lastly, support received during labor and delivery was correlated with decreased maternal depression over the transition to parenthood and at 8 months postpartum (see Appendix C).

Birth Risk Factors

Delivery mode was related to pain medication administration such that cesarean sections were indicative of earliest pain medication administration. Cesarean sections were also related to having an extended hospital stay and marginally correlated with intensive care needs. The practice of labor induction via Pitocin is marginally related to earlier administration of pain medication. The practice of labor induction was marginally correlated with hospital births and the administration of pain medication was correlated with hospital births. Hospital births were also correlated with longer stays than birth centers were. A lack of maternal control during labor and delivery was marginally related to a lack of support during labor and intensive care treatment. Lastly, intensive care was related to extended stay in the hospital after birth (see Appendix C).

Infant Attachment

Of all the risk factors associated with the birth risk index, the factor related to pain medication was the only factor correlated with infant attachment. Earlier administration of pain medication was positively correlated with infant disorganized attachment (see Appendix C).

Phase 2: Qualitative Results

FIVE-STEP THEMATIC FRAMEWORK

All 40 mothers' birth experience interviews were analyzed qualitatively, using the five-step thematic framework analysis laid out by Popeland, Ziebland and Mays (2016). The steps consisted of 1) cultivating a deep familiarity with the transcripts, 2) identifying a thematic framework, 3) indexing, 4) charting and 5) mapping and interpretation. To become familiarized with the raw data, I immersed myself by listening to the interview recordings and reading the transcripts. This allowed me to begin to identify key ideas and themes. Second, I identified a thematic framework, indexing themes and categories surrounding particular phrases, incidents, or types of behavior. To index, I annotated transcripts with identifiable codes pertaining to the essence, or the core thought behind a verbalized statement (Parse, 1996), of mothers' responses. For example, in response to the interview question, "How would you rate your childbirth experience overall?", many mothers' verbalizations fit the essence of, "The agony of labor and delivery was 'worth it', because I birthed a precious child." The identifiable code for this essence then became, "Worth it". This generated sections of text that could be easily navigated. Next, charting was done in order to organize multiple participants' indexed responses which fit under a key theme. For example, the theme of lack of control included the indexed codes of "birth plan not followed", "unwished procedure administered", or "inability to manage pain" under it. Lastly, mapping and interpretation was performed: the range, nature and association of the themes were explored and typologies were created.

Themes in Mothers' Birth Experiences

After completing the first four steps of the thematic framework analysis, four themes of mothers' birth experiences were conceived from interview transcripts: 1) Support from others,

2) Lack of control, 3) Coping through pain medication and 4) Benefit of child outweighs obstacles of childbirth.

Support from others

The trials and tribulations of childbirth pose an inherent need of mothers to receive comfort and support in coping. Romantic partners and attachment figures were by far the most common and frequented sources of comfort and aid in coping with labor pain and difficulties, for mothers. An attachment figure is someone older and wiser who provides protection and care to another (Bowlby, 1969/82), and this was usually the mothers' mother, but in some cases was an older sister or a godmother.

Typically, the spouse acted as the primary support figure for the mothers, even if her mother or other friends and family were present. When asked how supportive their spouses were during childbirth, many mothers began by remarking on their spouses' involvement and participation in prenatal care and birthing classes before discussing supportive behaviors during labor and delivery. It was typical for spouses to provide comfort, such as providing refreshments, support, like aid in breathing exercises and protection, in the form of standing up for the mother's birth plan when it was in jeopardy. Spouses provided both emotional and instrumental support:

> Well he was he went to Lamaze with me and he was very committed to trying to help me not experience a lot of pain if it was possible and so instead of just being there… He watched that monitor and told me everything that was going on, the fetal monitor, because I couldn't see it. If I had a question or a need, he would get the nurse for me. You know, whenever I would have a contraction he made sure that I was doing my

breathing and he breathed right along with me, and he just sort of went along with everything, every step of the way.

Mothers' own mothers were the second most frequented source of comfort and aid, after the spouse. When the mother's mother was her primary support figure, it was common for mothers to say something like, "um, he [partner] was fairly supportive, and once my mother got there she seemed to help a little bit more". Mothers rarely commented on their own mothers' involvement or participation in prenatal activities related to childbirth preparation. Mothers' own mothers mainly provided emotional support and little to no instrumental support; they were described as being in the background. Additionally, it was common for mothers to recount their mothers comforting or caring for their spouses during labor and delivery. One mother explains that her spouse needed a break and to eat, but wouldn't leave the delivery room to do so: "He [spouse] was there during the whole thing. And he wouldn't leave [laughs]. My mom had to make him leave at one point." Thus, mothers' own mothers' role as an attachment figure was often more encompassing than that of the spouses'.

When there appeared to be a breakdown in mothers' ability to utilize their spouse or other family member or close friend as a supportive figure, nursing staff were adopted by some mothers as substitutional figures. For example, one mother describes her partner's low support, explaining he did not know how to help her: "It was more or less inexperience or just not, not enough knowledge." She goes on to describe the nurse's support, which she was grateful for, since the nurse "let me get on my hands and knees, which pulled the pressure off of my back and I could actually feel a normal contraction. And, uh, when someone asked her, 'Why is she like that?'—'She's comfortable that way.'" Nurses provided care, like hand holding, protection, via medical monitoring, and support, such as staying past their shift, to mothers.

Lack of control

While the majority of mothers in this sample were recruited from birthing classes and recounted feeling "prepared" for childbirth in their interviews, many went on to describe behavior and circumstances which arose during labor and delivery that led them to feel a lack of control. Instances labeled as lacking control included examples of both internal and external control. Lack of internal control consisted of feelings of panic due to intense labor pain and/or, inability to regulate physical functions, usually due to side effects of medication(s). A mother who was unable to keep herself awake during the final stages of labor said:

> I was so tired. I was so hungry. My husband said that I was falling asleep. I mean the doctor would, um, tell me to push and then we would take a little break…I had to push when the contraction was happening. When we would stop I would put my head back and sleep. I don't know how I could push. I don't know where the strength was coming from but I just kept.

Another mother says she has little memory of her labor and recalls feeling "insane", which she attributes to labor pain medication:

> The labor became so long, I eventually got Demerol…the heavy-duty drug that's sort of like really strong [laughs]… Apparently I was saying all kinds of really rude things so I don't remember much about that…Um, then I finally, at one point, became, uh I think, uh, slightly insane because I remembered… I grabbed, I don't know, somebody's white collar, and I said 'Get this baby out of me or I will scratch my stomach open with my finger nails.'"

Lack of external control consisted of dealing with restrictive orders, such as not being allowed to eat, drink, get out of bed or move around, etc., violations of the birth plan and unwished medical intervention(s).

Coping through pain medication

Nearly all mothers felt unprepared for and/or, were surprised by the pain of labor contractions. Some mothers reported they panicked or hyperventilated, and the vast majority reported feeling pain that was excruciating and debilitating. To combat these feelings, most mothers relied on pain medication as their primary coping strategy. In order to combat the side effect of slowed contractions, most practitioners administer the epidural for labor pain relief when the mother is in active labor, with 4 -5 centimeters of cervical dilation (IQWiG, 2006). Thus, there was usually a period of labor before the administration of the epidural where mothers have to cope without it. During this time, mothers who were able to utilize an effective coping strategy most often practiced breathing techniques learned in birthing classes. However, it was very evident that the administration of pain medication was a saving grace to most mothers: "Well, early on, I really wasn't able to cope with it very well [laughs] at all, so once they got the epidural in, and I was able to calm down and relax"; "It was very horrible until I had the epidural."; "I mean after I had the epidural everything was great."; "Well, after I had the epidural it was no more problems."; "Luckily, I had an epidural, you know, and that calmed down my pain a lot.". Below is an example of a mother who felt panicky and out of control until receiving an epidural and another medication, after which she may not have been able to cope healthily; she may have felt more internal but less external control:

> I was just panicking. 'I can't relax, I can't relax!', and I just tried, and tried, and tried, but it just wouldn't work. And of course the contractions were coming much harder and, you know, closer in between and there wasn't that much relief. So, um, and then once they did give me the epidural… Then the anesthesiologist gave me something, which couldn't have been an epidural because at that point I just felt, um, like I was on another planet [laughs]. It was clearly, it clearly altered my, um, my conscious because when I was told

to push I was going, 'I don't really wanna push', you know? [laughs] 'I'm kind of happy the way I am', you know? [laughs]

Even a mother who had a natural birth free from pain medication decided she would definitely have an epidural during her next childbirth. Of the of mothers who had an epidural only 1 made any remarks alluding to any regret or dislike surrounding receiving an epidural: "I didn't really have any control over my body, it was frustrating."

Benefit of child outweighs obstacles of childbirth

After recounting their birth experience, both the positive and negative aspects of it, mothers almost unanimously concluded that they felt the end result of the birth—birthing their child—made the trials of labor and delivery "worth it". Other mothers remarked on birth's "amazing" and "wondrous" properties:

> The whole thing was incredulous to me, and to think that this was happening, and that I was fortunate to have it happening to me, and then to have this perfect little baby just pop out at the end. It was just great.

Such positivity trumped any negativity associated with their childbirth experience. A key detail in mothers' responses related to this theme is that the positive aspect that outweighs the difficulty of labor is the child and not some other reasoning (which some mothers did give). Over time, most mothers still recall the pain as intense but have disconnected the pain with their child.

Typologies

Finally, the indices and themes were mapped and interpreted in order to create typologies. In creating typologies, the range, nature and association of the themes were considered. The process of mapping and interpretation was influenced by the original research questions as well as by the themes that emerged from the data. Three main typologies

characterized by control and support, of which the other themes and indices adhered closely, emerged in mapping: mothers whose childbirths were marked by 1) sufficient control and support and 2) lack of control but sufficient support and 3) lack of control and support. No mothers' childbirths fell into the category of sufficient control but lack of support.

Mothers who adhered to the pattern of sufficient control and support (typology 1) during childbirth were able to cope, gain comfort and adequate support from their partners or attachment figures. These mothers felt mostly at peace with the processes of labor and delivery and were trusting of and satisfied with their medical professionals. The amount of rumination surrounding labor pain and any labor pain medication consumed, found in their transcripts, was minor in comparison to other typologies. Additionally, these mothers were able to reflect on the trials and tribulations of childbirth with an acceptance or understanding that allowed them to relish the birth of their child.

Mothers who lacked control but not support (typology 2) differed from those who lacked both in the indices of internal versus external control, chosen support figure and evaluation of birth experience overall. Mothers who lacked support in addition to control (typology 3) more often described issues with internal control, including feeling "frightened", panicky and hyperventilating. In addition, although these mothers had low support overall, they most often attempted to connect with nurses for support, instead of other support or attachment figures. Lastly, mothers in typology 3 frequently gave odd evaluations of birth that did not include describing its positive qualities of birthing a child as outweighing the trials of labor and delivery, in comparison to mothers who just lacked control. For instance one mother remarked, "I knew that I was okay, because I knew I would survive it." Some mothers simply did not believe childbirth was mostly positive: "It was short and I got this great baby out of it… But…nothing

that hurt that much could be that positive." Both of the latter two typologies seemed to have relied equally on pain medication as a coping strategy and appreciated the epidural.

CASE STUDIES

In addition to the thematic framework analysis conducted, a number of case studies were examined. Maximum variation sampling was utilized in selecting case studies. This sampling style calls for selecting a small number of cases that maximize the diversity relevant to the research question, in order to document unique or diverse variations that emerged in adapting to different conditions (Palinkas et al., 2015). Because this study follows a sequential explanatory mixed method design, the quantitative results from phase 1 should inform the direction of the qualitative analysis in phase 2. Thus, the case studies selected were chosen with consideration of the most compelling quantitative results: the interaction effects between birth experience risk and nonfluency word usage, in predicting infant attachment. While the interaction predicts both insecure and disorganized attachment, the probability functions are different for each. In order to understand why some mothers with high birth risk and high nonfluency have secure versus organized-insecure versus disorganized infants, three case studies where chosen that exemplify each scenario. Each of the mothers chosen had scores at or above the mean for both birth risk and nonfluency (see Table 5) and had unique birth experiences that set them apart from the "average" and were somewhat discrepant from the typology majorities which will be described below. Mothers were given fictitious names for the sake of this study, to protect confidentiality.

Case Study 1: Kathy

The first case study illustrates a mother-infant dyad that fared well despite scoring high on the birth risk index and nonfluency and reporting high levels of depression prenatally (see Table 5). Kathy reported experiencing a lack of control but experienced support during the birth

experience. Her depressive symptoms declined considerably over the transition to parenthood and her baby was able to form a secure attachment.

Kathy's birth experience

Kathy had a planned pregnancy and gave birth in a hospital. She delivered a baby boy vaginally, without instrumental intervention, after about 14.5 hours of labor. Due to "having back problems during my pregnancy", she was given an "extra dose" of epidural along with Demerol for pain management. Labor pain proved difficult for her for a couple of hours, especially in her back. She reports feeling "very scared" and that labor "wasn't at all what I expected...I don't think I was prepared for the extent of the pain", when asked how she coped.

Her partner and parents were present during labor and delivery. She felt strongly supported by all who were present during labor and delivery, including her partner, parents, doctor and other medical staff. She described being somewhat surprised by her partner's support, "He was a very patient which is atypical for him and just very caring and he was helpful which was unexpected....", and felt that her parents, "were there for me and would've done anything for me." Her doctor was "patient" and "explained everything that was going on and what would be happening." She also described the other medical staff as "patient" and remarked that they had an "uplifting attitude".

Her baby was born healthy. However, she was required to stay over 24 hours longer than typical after delivering, due to two reasons she explained. The first was related to having received an extra dose of epidural to combat pre-existing back pain: "I didn't have any feeling in my legs for about 24 hours after wards and I couldn't walk." Additionally, she suffered urinary tract trauma and was unable to urinate on her own. She reports that she doesn't "remember" having experienced any symptoms of postpartum depression.

When describing her birth experience overall, she exclaims, “After everything.... just having [my baby] just made everything worthwhile.” When asked how childbirth affected her as a parent, Kathy says she doesn’t think about the childbirth when taking care of her son.

Summary of Kathy’s Case Study

Kathy answers the interview questions matter-of-factly, providing what appears as brief but honest evaluations of her experiences. Having issues of both internal and external control (exacerbated labor pain and later bodily functioning issues), receiving earlier pain medication administration and having an extended hospital stay set Kathy up for having a high birth risk. However, the integrity she felt in her support system seems to have been the redeeming quality of her birth experience. She does not allude to any negativity surrounding either her doctor or other medical team members, and describes her doctor as “patient”, which is an uncommon sentiment in this study sample. When describing the issues surrounding her lack of external control, Kathy does not ruminate on why or how they happened; she seems to have come to accept the problems that occurred during childbirth.

Case Study 2: Sarah

The second case study illustrates a mother-infant dyad that had a difficult transition to parenthood. Sarah reported feeling totally in control and experiencing great support. However, in addition to scoring around the average on the birth risk index and high for nonfluency, Sarah reported high levels of depression prenatally which did not decline. Sarah’s baby formed an organized-insecure attachment relationship with her.

Sarah's birth experience

Sarah became pregnant after she and her partner "Kinda quit trying and all of the sudden I was pregnant". She had been told that she was pregnant with a girl, but delivered a healthy baby boy vaginally, with forcep intervention, after about 6.5 hours of labor in a hospital. Her labor began naturally, "then nothing happened for a while so they then [mumble] said that it was induced." She received an epidural and a muscle relaxer during labor.

Her partner was present during labor and delivery, but no other friends or family were present. When asked how supported she felt by her partner, she calls him, "Perfect. I mean he's as close to it as you can get. He can't read my mind, I mean, he was really good. He helped me with breathing, um…" However, then Sarah quickly changes the subject to her epidural and her speech becomes fragmented until she abruptly ends her thought process:

> I kept saying 'mmm' through my epidural…Basically what it boils down to is that he was born on a Sunday. There was only one, uh... the doctor that gives you the epidural… He was a slugger. Hold on now.

Her doctor throughout her prenatal care was unavailable the day of her delivery, so she was assigned another doctor she had previously met and did not care for, but seems to end up having mixed emotions about him:

> He was my least favorite of the 3 [doctors] and, um... he actually came up and was pretty nice and supportive and a little more upbeat than he had been at the doctor office.... um, he was very supportive. He did say... that, you know, we were looking at a c-section... Things like that. Like, he was being honest with me but was kind of a downer.

Sarah felt that the support received from other medical staff was "really good", which she justifies by explaining that her nurse "was supposed to get off at 1, but we needed more… she stayed on past an hour."

When asked how well she felt she coped with labor, Sarah rated herself moderately, explaining, "because of the epidural; the epidural was only an hour and… hmm a half of it." When looking back on whether or not she was prepared for childbirth, she was not so confident, "I mean Lamaze was great, although it didn't really get on what I was going through totally." Overall, she felt her childbirth experience was:

> Extreme… having to wait for the epidural was one of the negative ends of it, but I got the baby out of it... It brought me and my husband closer and it was the first grand baby, first grandbaby on both sides. That was pretty neat.

Additionally, when asked if her childbirth experience has affected her in any way as a parent, she reports she feels "more sympathetic towards pain. [laughs] ...If I didn't have to go through that, would I be any different toward [son]? Hmm, mediocre about that."

Summary of Sarah's Case Study

Sarah scored low to slightly at risk for control and support in her birth experience. However, on deeper inspection, things may not be as glorious as she lets on. Sarah has a difficult time describing her husband's support during labor. She begins by glossing over any concrete description and calls him "perfect", but then admits he could not "read my mind" and quickly and somewhat incoherently changes the subject to something unrelated which she describes feeling annoyed about. This appears less credible of an evaluation in comparison to her descriptions of the support she received from the doctor and nurses, which was coherent and justifiable. Another red flag in Sarah's birth experience is her self-rated, poor ability to cope with childbirth because of the "extreme" pain. In fact, her only explanation of how she coped was a reference to her epidural. It was uncommon in this study sample for mothers to rate themselves poorly on coping, but affirmations of the epidural's help with coping was common. In the end,

Sarah does acknowledge that she feels the birth of her baby was worth the pain of labor. Oddly though, when asked to describe how the childbirth experience may have affected her caregiving, she remarks on being more sympathetic to pain as if it was the experience of pain during childbirth itself that might have made her more sympathetic of her infants' discomforts.

Case Study 3: Elizabeth

The last case study illustrates a mother-infant dyad that had one of the most difficult birth experiences in the sample, reporting both a lack of control and lack of support. In addition to scoring high on the birth risk index and nonfluency, Elizabeth reported high levels of depression prenatally which declined over the transition to parenthood. Elizabeth's baby formed a disorganized attachment with her.

Elizabeth's birth experience

Elizabeth delivered her baby vaginally with some instrumental intervention in a hospital, after 4 hours of labor. Her labor did not begin naturally; she was induced and received an epidural for pain management. When asked if her child was planned, Elizabeth responds that the pregnancy was planned but that she initially did not realize she was pregnant for some time:

> Yes... um, we had decided that we were ready to start having children. We had been married I guess um... probably two years… and took it about 11 months. When periods were becoming further and further apart and I wasn't getting pregnant and I thought I wasn't ovulating properly. So, I went to the doctor and um, I found out that I was indeed pregnant.

A month prior to giving birth, Elizabeth had surgery on her "detached retina" and was thus "not supposed to push" during labor. She attributes the administration of epidural to

allowing her not to have to push: “It was why I had an epidural - because I was not supposed to push.” Unfortunately, this caused some difficulty:

> And, so, um, towards the end there it got kinda, uh-uh, we had a little bit of difficulty because the baby wasn’t coming out. I wasn't able to push. The nurse and my husband were having, um, like having to push on my stomach to make him [baby] come out. That moment was scary because I thought they were crushing my baby... so, I mean up until that it was great and then that one moment [inaudible].
>
> I couldn't push and they were having problems getting him out and they were using the vacuum and, um, apparently it wasn't up high enough and--the power on it or something. I remember the doctor getting a little upset with the nurse. And when they got it to the right suction, I guess, then-then it was fine. But for a second there it was kinda scary.

Her partner was present during labor and delivery, but no other family members were present. She discusses her partner’s involvement prenatally, when asked about his support during labor and delivery: “Everything I went through he wanted to be a part of and so I tried to make him a part of it. So it, it was, you know, really wonderful--an enjoyment.” She describes the support of her doctor during labor and delivery as brief: “We had spent more time with the nurses, and he came in briefly, um, to check on me.” She goes on to praise the nurses’ support:

> They checked on us a lot. They gave us anything we wanted, they gave us... They were just really... really wonderful and, um, just very personal and-and, just, they took really good care of both of us… During the time we were there, they had to change shifts so they would go in [inaudible], one of the nurses would get off work, she'd been with you all day. I-I got kinda attached to them.

When answering the question surrounding how she coped with childbirth, Elizabeth instead describes her experiences with pregnancy:

> Um... I think, ya' know, I was really excited for the whole thing and I had a lot of morning sickness and [inaudible] and towards the end I had problems with my eye... and it was even worse because I was pregnant and [inaudible, something about her surgery]. Towards the end it all got stressful and [inaudible].

She does, however, feel she felt prepared for childbirth just "as much as somebody can be."

Looking back on the postpartum period, Elizabeth remembers feeling some symptoms of postpartum depression:

> Yeah, I was just a little weepy. Most of it I think was from lack of sleep, but I tend to be that way anyways, if I'm real tired. Uh, I noticed that, um, I was kinda on edge for a while and that kinda made me cry. I was never depressed about the child, it was just everything else bothered me.

However, she feels like her birth experience overall was "very positive":

> Uh, just everything we did was so well worth it. He was a wonderful baby, and he is still a really good boy, and, um... everything about... -it's just more than we thought it was gonna be and just exceeded all our expectations.

Summary of Elizabeth's Case Study

Elizabeth scored high for risks of control and moderate on support during childbirth. Elizabeth failed to answer the question of how her spouse was supportive for her during childbirth. Instead, she says she "tried" to make him a part of the pregnancy experience. She felt as though her doctor was not as supportive as he could have been, but goes on to admit she became "attached" to the nurses. Her lack of control was very apparent externally, in her

inability to contribute physically to her baby's birth by pushing in the last stages of labor, which led her spouse and nurse to intervene in an unappreciated way: pushing on her stomach to force the baby out. This intervention, in and of itself, was frightening to Elizabeth who discloses she thought they were going to crush her baby. In effect, she is saying that her two support figures during childbirth put her baby's health and perhaps life at risk, which is entirely antithetical although it is never acknowledged as inconsistent by Elizabeth. Elizabeth also dodged the question of how she coped during childbirth, instead answering with a contradictory statement about how she was excited while pregnant but experienced morning sickness and other troubles. Internal control seemed to become an issue for her in the postpartum; she recounts feeling unable to regulate her emotions properly, feeling "bothered" by "everything" and "weepy", but "never depressed about the child". Lastly, Elizabeth describes that her birth experience was "worth it" and justified this by saying her baby was "a wonderful baby" and "still a really good boy". Her reply leaves the listener wondering whether she would have been as comfortable with her difficult delivery if her child was not so wonderful.

Table 5.

Mothers selected for case study analysis

	Case Study 1	Case Study 2	Case Study 3
Z-Scores			
Prenatal Depression	.41	-.56	-.56
8 month Postpartum Depression	-.72	.99	-.88
Birth Risk	.44	.01	1
Nonfluency	.27	.52	.53
Attachment Classification			
Infant-Mother Attachment	Secure	Organized-Insecure	Disorganized

Note. Z-scores indicate the standard deviations above the mean that the raw score is.

DISCUSSION

The main purpose of this study was to identify links between the holistic maternal birth experience and mother-infant relationship quality as measured through infant attachment classification. Two additional aims of this study were: to 1) examine depression trajectory over the transition to parenthood and in relation to maternal birth experience and infant attachment, as well as to 2) analyze maternal speech nonfluency in birth experience recall to understand whether it is indicative of a negative birth experience, depression over the transition to parenthood and/or, associated with infant attachment. Findings from this study suggest that a negative maternal birth experience, characterized by high risk of negative effects on the mother-infant relationship, is not predictive in and of itself of mother-infant attachment, but its interaction with maternal speech nonfluency during birth experience recall is indeed predictive of both insecure and disorganized infant attachment. The qualitative analyses used to explore the aims of this study more deeply uncovered several important themes in mothers' birth experiences of: 1) Support from others, 2) Lack of control, 3) Coping through pain medication and 4) Benefit of child outweighs obstacles of childbirth. Mothers who are most at risk for having an infant with an insecure or disorganized attachment show a breakdown in their ability to find comfort in support or attachment figures, experience marked lack of internal control along with low support, rely heavily on pain medication as a coping strategy and do not express a clear sentiment that the birth of their child, specifically, outweighs the trials of labor and delivery. First, I will discuss the empirical associations among depression, birth experience risk factors, nonfluency and infant attachment. Then, the reasons how and why the themes and typologies found in mothers' birth experience transcripts may relate to these variables will be interpreted and discussed. Next, in conjunction, the three case studies conducted will be analyzed and

interpreted with respect to all results. Finally, this study's practical applications, limitations, and contributions to future research directions will be discussed.

DEPRESSION

Several measurements of maternal depression over the transition to parenthood were captured in the current study. Prenatally and 8 months postpartum, depression was measured via a widely used depression inventory and at 12 months postpartum mothers retrospectively described their feelings (if any) of postpartum depression. The majority of mothers decreased in depression from prenatal measurements to 8 months postpartum. This is not in line with research on maternal depression symptoms and mood over the transition to parenthood; depression is usually at its highest at around a year postpartum (Matthey, Barnett, Ungerer & Waters, 2000). The lack of increased depression in this study is likely due to the small sample size, which may not capture a wide range of maternal depression trajectories. Furthermore, research shows postpartum depression is related to increased depression over the transition to parenthood (Matthey et al., 2000). Despite this, only prenatal depression was related to mothers' retrospective reports of postpartum depression. Again, issues of statistical power related to our small sample size may be behind the failure of 8 month depression measurements to be related to others. Alternatively, there may be an issue of pregnancy or postpartum related symptomology (i.e., unique hormonal effects on behavior) causing prenatal and postpartum depression to be correlated without relating to 8 month depression. The depression inventory utilized prenatally and at 8 months postpartum (the CES-D) may not be sensitive enough measure of depression, considering related symptomatology which appears during pregnancy and the postpartum period for women (Affonso, Lovett, Paul & Sheptak, 1990).

Depression & Nonfluency

Contrary to hypotheses, the change in depression over the transition to parenthood was unrelated to speech nonfluency in mothers' recalled birth experiences. Nonfluencies include utterances such as "hmm", "uh", "um" or stutters (LIWC, 2015). Mothers who have postpartum stress disorder and/or postpartum depression use more nonfluencies in speech than typical mothers (Ayers, Radoš & Balouch, 2015; De Choudhury, Counts & Horvitz, May 2013; Santoro et al., 2018). It is possible that mothers in this study did not experience birth trauma severe enough to warrant an increase in depression over the transition to parenthood, or if they did they were able to cope in a way that successfully lessened the chance of increased depression symptoms. A birth is said to be traumatic if the mother's or her baby's life was in danger, or if there was a serious threat to the mother's or her baby's physical or emotional integrity (Simkin, 2019). Hence, it may be that while nonfluency is present, the volume of it is not indicative of trauma-induced depression lasting 8 months postpartum. Interestingly, mothers' retrospectively reported postpartum depression symptoms *were* related to nonfluency. This upholds the reasoning that while some mothers may have felt post-traumatic stress or anxiety from the birth, which was obvious through their nonfluency, it was still not prognostic of later depression.

BIRTH RISK

The birth experience risk index created in this study was based on previous literature surrounding links between objective and subjective aspects of the birth experience in affecting the mother-infant relationship. Risk factors were correlated in expected ways. Delivery mode was related to pain medication administration such that cesarean sections were indicative of earliest pain medication administration. Cesarean sections were also related to having an extended hospital stay and marginally correlated with intensive care needs. Since a cesarean

section involves an invasive surgical procedure, it is inherent that earlier pain medication administration is necessary as well as extended outpatient care ("Cesarean", 2019). Additionally, since some Cesarean sections were unplanned due to the atypical medical emergencies that occurred during labor, intensive care is characteristic of these deliveries (Humphreys & Totapally, 2016). In line with this, the practice of labor induction via Pitocin is marginally related to earlier administration of pain medication. This is understandable since Pitocin is known to increase the severity of labor contraction pain, thus earlier pain medication administration may be warranted (Simpson & Atterbury, 2003). The practice of labor induction was marginally correlated with hospital births and the administration of pain medication was correlated with hospital births; labor induction is not practiced in settings with natural birthing techniques and pain medication is not commonly administered, especially stronger pain medication such as opioid epidurals or narcotics like Demerol (Collins, Starr, Bishop & Basinger, 2012). Hospital births were also correlated with longer stays than birth centers were, this is in line with the practices associated with these settings (Fink, 2011). Moreover, a lack of maternal control during labor and delivery was marginally related to intensive care treatment, which reflects related literature (Elmir, Schmied, Wilkes & Jackson, 2010). Lastly, intensive care was related to extended stay in the hospital after birth. When receiving intensive care, it is commonplace to stay longer than typical in the hospital, even if it is solely for purposes of medical surveillance (Liu et al., 2002).

Depression & Birth Risk

Also in contradiction with hypotheses, depression over the transition to parenthood was not related to mothers' total birth experience risk. A possible explanation for the lack of correlation between change in depression and birth experience risk may be due to the

heterogeneity of the risk index and the equal weight placed on each risk factor. However, it is more likely that mothers in the current study did not experience trauma or complications severe enough to warrant effects on depression. When trauma occurs, mothers' subjective birth experience is predictive of the development of postpartum stress disorder and/or depression (Ayers & Pickering, 2001; Righetti-Veltema et al., 1998). Additionally, infants' perinatal anomalies (i.e., prematurity, low birth weight or physical injury) can affect maternal postpartum depression, via often correlated consequences, such as maternal feelings of guilt, inadequacy and/or inefficacy (Campbell et al., 2004; Huth-Bocks, Levendosky, Bogat, & Von Eye, 2004). Trauma and anomalies such as these were not found in the current study.

Exploratory Findings

Due to the lack of significant findings related to the cumulative birth experience risk index, individual birth experience risk factors were examined in exploratory analyses. Through this, it was uncovered that earlier administration of Pitocin for labor induction was marginally related to postpartum depression symptoms. This link has also been identified in other research and explained by Pitocin's negative effect on mood (Kroll-Desrosiers et al., 2017). Furthermore, this is in line with research cited in this study's literature review on the neurohormonal effects of hormone-altering drugs during labor and delivery potentially affecting the mother's mental health (Olza-Fernández et al., 2014).

Additionally, earlier pain medication administration during labor and delivery was found to be marginally related to an increase in depression over the transition to parenthood. Several studies, however, including a prospective cohort study, found quite the opposite: epidural pain relief is associated with a decreased risk of postpartum depression (Ding et al., 2014; Hiltunen, Raudaskoski, Ebeling & Moilanen, 2004). In agreement with these studies, however, is that

postpartum depression, as measured in the current study, was not related to pain medication administration. In other words, there are no studies, to my knowledge, that have examined depression over the transition to parenthood, prenatally and around 8 months postpartum, in relation to pain medication administration during labor and delivery. So, this finding may be a novel contribution from this study. It is likely that individual differences associated with the consumption of labor pain medication are also involved in increasing depression over the transition to parenthood. Characteristics associated with mothers who catastrophize pain during childbirth and consume more pain medication are discussed in following sections.

Examining birth risk factors separately also yielded the finding that support received by the mother during her birth experience, both from family and medical staff, was associated with less depression at 8 months postpartum and a decreasing depression trajectory over the transition to parenthood. This finding is consistent with prior studies showing that support during labor and delivery is important for maternal coping (Ford & Ayers, 2011) and with maternal depressive symptoms (Nylen, O'Hara & Engeldinger, 2013). A lack of support during birth may be indicative of a lack of support in the mothers' personal life (i.e., with her spouse) and thus the negative effects on maternal mental health are extended beyond the immediate postpartum period subsisting at 8 months postpartum (Small, Brown, Lumley & Astbury, 1994). Additionally, the birth risk factor of control during childbirth was marginally related to retrospective postpartum depression symptoms, but not change in depression or prenatal and 8 month measurements, which is in agreement with the literature (Green & Baston, 2003).

Delivery mode was not found to relate to maternal depression, which is in line with other research (Eisenach et al, 2008). Contrary to prior studies, the other birth risk factors in this study, including experience in intensive care and an extended hospital stay, were not significantly

correlated with depression over the transition to parenthood, as predicted based on the literature (Lefkowitz, Baxt & Evans, 2010; Mandl, Brennan, Wise, Tronick & Homer, 1997). A likely explanation for the lack of associations between maternal depression and experience in intensive care and an extended hospital stay is that sample size did not yield sufficient power. Of the 40 mothers in the study, only 2 mothers experienced intensive care for non-life-threatening issues and 2 reported an extended hospital stay of 24 hours or more.

The birth risk factor of place of birth (i.e., hospital versus birthing center) was unrelated to other study variables of interest and it is likely that it is confounded with the other birth risk factors related to hospital practices. Place of birth was originally included based on literature surrounding the findings that in general natural births were correlated with less disruptions to the mother-infant relationship in the early postpartum (Peterson & Mehl, 1978). The mechanisms behind this link were thought to be related to highly intervening practices associated with hospital such as frequent disruptions by nurses and hospital staff that may impede mothers' ability to maintain peace and cope during childbirth or to spend quality, uninterrupted time with her newborn.

NONFLUENCY

Nonfluency & Birth Risk

Mothers' speech nonfluency was hypothesized to correlate with maternal birth experience risk. However, this was not found in the current study. Additionally, no individual birth risk factors (except for postpartum depression symptoms) were related to nonfluency, in exploratory analyses. Since nonfluency *does* appear in our sample and *is* related to mothers' retrospective descriptions of postpartum depression, the failure to find a link between birth risk and nonfluency may be due to the birth risk index's insensitivity to mothers' perceptions of trauma. It

is known that nonfluency occurs in individuals' discussions of previous trauma and also in mothers suffering from postpartum depression (Reed, Sharman & Inglis, 2017), however, maternal perception may be more important than the objective measures of trauma captured in the current study's birth risk index. A goal of this study and the reason for examining nonfluency was to utilize nonfluency as a proxy for maternal postpartum stress or anxiety, stemming from birth-related trauma, in order to capture any unresolved feelings mothers may not explicitly state. This was thought to be an important contribution for clinical application, since nonfluency can provide an easy and accurate avenue for clinical screening tools. Future research is needed to understand the pathways to nonfluency in recalls of the birth experience.

INFANT ATTACHMENT

A primary aim of this study is also to understand whether or not birth experience influences mother-infant attachment at 12 months postpartum. It was hypothesized that birth experience risk, nonfluency in birth experience recall, and depression over the transition to parenthood would all be correlated with insecure and disorganized mother-infant attachment. Moreover, it was hypothesized that birth risk would interact with nonfluency to predict infant attachment. Interestingly, the current sample had more disorganized infants than typically found in similar populations. It is unclear why this may be. No variables in the current study were found to be correlated with insecure infant attachment and neither the cumulative birth risk index nor depression over the transition to parenthood were related to disorganized infant attachment. However, nonfluency in recalled birth experiences and the birth risk factor of pain medication administration were correlated with instances of disorganized infant attachment.

Correlates

Depression

In contrast to hypotheses, depression over the transition to parenthood was not correlated with infant attachment. The previous literature on maternal depression shows mixed findings, with the most evidence pointing to chronic, severe depression as a predictor of infant attachment insecurity (Flowers, McGillivray, Galbally & Lewis, 2018). A strength of this study was its use of several depression measurements over the transition to parenthood, versus associations between concurrent depression and attachment as most previous studies have done (Laurent et al., 2011). The current sample was nonclinical and most mothers appeared to decrease in depression symptomatology over the transition to parenthood, thus it is understandable why the connection with infant attachment may not have been found.

Birth Risk

Counter to hypotheses, cumulative birth risk was not correlated with attachment. While this is in contrast with prior research on infants with perinatal risk and poor scores on neonatal behavioral assessments, showing a link to infant attachment insecurity and disorganization (Sprangler, Fremmer-Bombik & Grossman, 1996; Udry-Jørgensen et al., 2011; Waters, Vaughn & Egeland, 1980), the relative severity of such related birth risk factors in this study was low. The lack of perinatal risk coupled with the small size of our sample may be behind the failure to uncover a correlation between birth risk and attachment.

Exploratory Findings

Exploratory analyses revealed the individual birth risk factor pertaining to timing of pain medication administration during labor was positively correlated with disorganized infant attachment. This is an incredibly interesting and unexpected finding. However, due to its link

with disorganization and not insecurity, it is difficult to postulate whether there may be physiological effects related to neurohormonal disruptions caused by pain medication (Olza-Fernández et al., 2014), behind the correlation between earlier pain medication administration and infant disorganization. In order to make sense of this and identify links to previous research, the literature on maternal usage of labor pain medication will be examined, followed by the literature on maternal predictors of infant disorganization. Lastly, a possible bidirectional beginning of a disorganized mother-infant relationship is discussed in terms of the literature surrounding negative effects on neonate behavior stemming from labor pain medication.

The research on pain during labor and delivery has revealed certain individual characteristics of mothers who catastrophize pain felt during childbirth and consume more pain medication during childbirth (Costa-Martins et al., 2014; Ferber & Feldman, 2005; Price, McGrath, Rafii, & Buckingham, 1983; Waldenström & Irestedt, 2006). When focused mainly on their own pain during labor and less on the baby they are birthing, mothers report higher pain levels; these mothers seem to ruminate more over their own emotional state than their infants' (Price et al., 1983). Low pain tolerance and threshold has also been theorized to relate to lower thresholds of emotional or stressful situations or higher frustration level in the caregiving role, since low labor pain tolerance is known to be related to lower reciprocity in mother-infant interactions at 6 weeks postpartum (Ferber & Feldman, 2005). In regards to mothers who use more pain medication during labor and delivery, studies show that they also report higher pain overall (Waldenström & Irestedt, 2006). Mothers who consume more pain medication during childbirth more often report that they are avoidant with respect to romantic attachment relationships (Costa-Martins, 2014; Wilson & Simpson, 2016) and receive less support from caregivers during childbirth (Hodnett et al., 2013; McGrath & Kennell, 2008).

Mothers of disorganized infants are often classified as unresolved with respect to loss and/or trauma, as measured by the Adult Attachment Interview; having an unresolved mother is a robust indicator of a disorganized mother-infant relationship (Madigan et al, 2006). It is not known whether unresolved mothers catastrophize labor pain or opt to take labor pain medication more often than mothers who are not unresolved (Meredith, 2016). However, the personal characteristics found in mothers who catastrophize pain and consume more labor pain medication during childbirth, such as emotional self-absorption, are similar to those identified in the literature on unresolved mothers of disorganized children (Beebe et al., 2012). Additionally, unresolved mothers show more negative emotion, anger and anxiety with their spouses and children (Busch, Cowan & Cowan, 2008), which may explain the link with heightened frustration with caregiving (Ferber & Feldman, 2005) and is in line with the findings of poor relationship quality in mothers who consume more labor pain medication (Costa-Martins et al., 2014; Hodnett et al., 2013; McGrath & Kennell, 2008; Wilson & Simpson, 2016). Unresolved mothers sometimes show frightened, frightening and dissociative behavior, especially during instances that remind them or trigger fright, related to the cause of their unresolved emotions (Lyons-Ruth & Jacobvitz, 1999). It may be the case that the intense pain experienced during childbirth is frightening, causing unresolved mothers exacerbated fright, which they cope with by taking more pain medication. Thus, the mechanism linking earlier pain medication usage and disorganized infant attachment found in the current study may be related to mothers' unresolved issues, which predispose mothers to higher pain medication usage. More research is needed to understand the relationship between labor pain medication consumption and infant disorganized attachment. Interestingly, the association between earlier pain medication administration and infant disorganization found in the current study is similar to that of maternal unresolved state of

mind and infant disorganization (r = .35 and r = .31, respectively; van Ijzendoorn, 1995). Further evidence from the qualitative portion of the current study supporting the idea that an unresolved trauma or loss may be behind earlier labor pain medication consumption and disorganization is discussed in the qualitative discussion section.

On another note, pain medication received during labor and delivery is known to produce negative effects on neonate behavior (Ransjö-Arvidson et al., 2001), suggesting a possible bidirectional beginning of a negative mother-infant relationship trajectory, stemming from use of pain medication during labor. Neonates born to mothers who consumed labor pain medication cry more often, have higher temperatures and have difficulty breastfeeding (Ransjö-Arvidson et al., 2001). It is possible that these infant characteristics interact with mothers' individual characteristics associated with labor pain medication consumption elevating the risk of infant attachment disorganization. Infant temperament has been related to infant disorganization (Granqvist et al., 2017). However, the results from a systematic review on labor pain medication's effects on neonates are mixed, so this hypothesis should be taken with caution (Leighton & Halpern, 2002).

Nonfluency

The hypothesis that nonfluency in mothers' recalled birth experience narratives would be correlated with infant attachment was partly confirmed. Nonfluency in mothers' recalled birth experience narratives was positively correlated with infants' disorganized attachments, but not insecure attachments. As far as the author is aware, there is no research linking maternal nonfluency with infants' disorganization.

The current study chose to include nonfluency as a variable of interest because of its established relation to feelings of postpartum stress and depression after birth (Ayers et al., 2015;

Santoro et al., 2018), which were hypothesized to occur after a high risk, traumatic birth experience and thus nonfluency served as a proxy measure of post-traumatic stress. Mothers with postpartum stress show controlling behavior with their infants and distorted maternal representations of their infant (Forcada-Guex et al., 2011); other studies have found links between post-traumatic stress disorder, unrelated to childbirth, and infant disorganization (Enlow, Egeland, Carlson, Blood & Wright, 2014).

As discussed in previous sections, the strongest predictors of infant disorganization stem from mothers' attachment related issues of unresolved loss and/or trauma as measured via the Adult Attachment Interview (Madigan et al, 2006). However, in the case of the link between nonfluency and disorganization, it is unclear whether a maternal unresolved state is related. It should be noted though, that a study using the same sample as the current, found that all the mothers who reported having feelings of postpartum depression in the birth interview were also classified as unresolved (Sweeden-Yates, 1995), and nonfluency was correlated with postpartum depression symptoms in the current study.

The coding procedures of the Adult Attachment Interview strictly prohibit the inclusion of nonfluency related utterances and speech patterns in making decisions surrounding coherency. This is because speech nonfluency may be related to education level or intelligence (Main, 2000). Interestingly, unresolved individuals show speech patterns akin to those with post-traumatic stress disorder, since they both present unintegrated, psychologically segregated perspectives regarding experiences of loss or trauma, fragmented from other memories (Fearon & Mansell, 2001). Perhaps, nonfluency has some associations with unresolved feelings if an individual appears nonfluent only when discussing the source of trauma or loss, since changes in speech surrounding trauma or loss are factors of consideration when coding for unresolved

states. Comparatively, the association between nonfluency in birth experience recall and infant disorganization found in the current study is similar to that of maternal unresolved state of mind and infant disorganization (r = .35 and r = .31, respectively; van Ijzendoorn, 1995). Furthermore, individuals classified as unresolved by the Adult Attachment Interview are more likely to be diagnosed with post-traumatic stress disorder after an event of trauma (Stovall-McClough & Cloitre, 2006) and to suffer from chronic post-traumatic stress disorder (Crittenden & Heller, 2016; Heller, 2013). In the same vein, one study found that previous sexual trauma (a trauma that may cause an unresolved classification) affects women's subjective experiences of birth, such that over half of the women with sexual trauma found birth to be traumatic and a third tended to develop post-traumatic stress disorder (Soet, Brack & Dilorio, 2003). In effect, it is unclear whether an unresolved state along with, or solely postpartum stress is behind maternal nonfluency. Further evidence from the qualitative portion of the current study supporting the idea that an unresolved trauma or loss may be behind the link between nonfluency and disorganization will be reviewed in the subsequent discussion section.

INTERACTION EFFECT: BIRTH RISK & NONFLUENCY

In addition to correlations between variables of interest in the current study, it was hypothesized that maternal birth experience risk would interact with nonfluency in recalled birth experience narratives to predict infant attachment. This hypothesis was confirmed in analyses. Both infants' insecure and disorganized attachment was related to the interaction between a high birth risk and high nonfluency in recalled birth experiences, above and beyond the change in depression over the transition to parenthood and the individual variables alone. Infants were six times more likely to be classified as insecure and eight times more likely to be classified as disorganized, for every standard deviation increase in the interaction term for birth risk and

nonfluency. For every standard deviation increase in nonfluency alone, infants were eight times more likely to be disorganized. These odds ratio are higher than that of anomalous parenting's effect on forming a disorganized attachment, which is four times more likely (Madigan et al., 2006) and similar to that of infants who have spent time in the NICU who are six times more likely to be disorganized (Pennestri et al., 2015). It should be noted that it is possible that the interaction predicting insecure infant attachment came about solely as a byproduct of the disorganized infants classified as insecure when dummy-coded. Of those coded as insecure, about 52% were disorganized.

It is interesting that birth risk alone did not predict infant attachment—it only predicted attachment insecurity and disorganization when mothers display high frequencies of nonfluency during discussion of a difficult birth specifically. This endorses the idea that nonfluency is related to a negative internalization of a high-risk birth, affecting the mother-infant attachment relationship. As discussed in previous sections, mothers' vulnerability to a risky birth and subsequent nonfluency may lie in prior unresolved trauma or loss, which is also related to infant disorganization.

QUALITATIVE INTERPRETATION

Qualitative techniques were utilized to uncover themes and trends in mothers' birth experience transcripts in an effort to explain quantitative findings and expand on research questions. A theoretical framework analysis was done in order to highlight common themes and uncover co- occurring characteristics unable to be identified by quantitative analyses alone.

Themes

After completing the first four steps of the thematic framework analysis, four themes of mothers' birth experiences were conceived from interview transcripts: 1) Support from others,

2) Lack of control, 3) Coping through pain medication and 4) Benefit of child outweighs obstacles of childbirth. These themes echo those from other qualitative studies of childbirth. Support from family and medical professionals emerged as a strong theme in a study identifying first time mothers' needs and experiences in childbirth (Cronic, 2003), as it also did in the current study. A study of childbirth trauma found the theme of "The 'I' in Childbirth", described as being active and informed and not undermined or excluded from childbirth processes (Byrne, Egan, Mac Neela & Sarma, 2017), which closely ties to the current study's theme of lack of control. The same study noted a theme of "Detached Self", described as coping through detachment—this is in line with the current study's theme of coping through pain medication. Mothers often cited solely things to do with pain medication when asked how they coped, instead of utilizing internal techniques or others' help. The study on first time mothers also identified the theme of "Motherhood", described as mothers' joyful reactions to the birth of their baby (Cronic, 2003). This is captured in the current study's theme of the benefit of the child outweighing the obstacles of childbirth.

Typologies

Typologies were created based on essences and themes found in mothers' birth experiences, which appeared to center around control and support, and included: mothers whose childbirths were marked by 1) sufficient control and support, 2) lack of control but sufficient support and 3) lack of control and ineffective support. No mothers' childbirths fell into the category of sufficient control but lack of support. The latter fact is interesting in and of itself, and points to the reality, also found in other studies, that without adequate support during childbirth, either from medical staff or family, it is nearly impossible for mothers to maintain internal control during childbirth (Green & Baston, 2003).

Mothers who had both sufficient support and control were able to cope with childbirth through their partners and/or attachment figures instead of through other less effective avenues like a nurse or labor pain medication. These mothers were also fortunate to not experience circumstances beyond their control which may have caused them to lose internal control. This is in line with research showing maternal feelings of internal control positively influence maternal satisfaction with pain relief during labor (McCrea & Wright, 1999) and support from medical staff during birth can buffer mothers from stressful events (Ford & Ayers, 2009).

Mothers who lacked support in addition to control (typology 3) had the highest incidences of nonfluency and birth risk as well as the highest percentage of disorganized infant attachment. In comparison to other typologies, these mothers more often described issues with internal control, including feeling "frightened", panicky and hyperventilating. Fearful affect is related to mothers of disorganized infants who are categorized as unresolved with respect to attachment loss and/or trauma (Madigan et al., 2006). Fear is also likely behind the request of earlier pain medication administration, by mothers in the current study during childbirth. Previous studies show mothers who have a fear of childbirth request more pain medication during labor and delivery (Carvalho, Zheng & Aiono-Le Tagaloa, 2014). As mentioned, unresolved mothers may overcompensate during fear inducing and trauma triggering circumstances, like a high-risk childbirth, prompting them to cope with pain medication and manifests in infant disorganization.

Case Studies

Kathy

Kathy was at risk for developing an insecure or disorganized attachment with her infant, based on quantitative trends, since she had moderately high birth risk and nonfluency, reported

receiving earlier labor pain medication and rated herself low on coping, but formed a secure attachment. A notable difference between her birth experience and those of the two other case studies' was in her ability to answer each interview question matter-of-factly with comprehendible justifications. Kathy showed high primary process integration in her birth experience interview, which is indicative with having a secure attachment relationship with one's child. Maternal primary process integration, which captures the "mother's capacity to freely, flexibly, and coherently access and communicate unconscious derivatives of affectively charged experience" (Frank et al., 1994; p.476), is positively related to infant attachment security at 12 months.

Sarah

Sarah, while low on birth risk and moderate in nonfluency, increased in depression over the transition to parenthood and formed an organized-insecure relationship with her infant. Sarah discussed having great support and control during her childbirth. However, she was unable to provide adequate examples and justifications when prompted and instead switched the subject to something unrelated entirely. Speech violations related to manner, relevance, quantity and truthfulness are common in Adult Attachment Interview transcripts of mothers of insecurely attached infants (Main, 2000). It is likely that discussing close relationships and the need for support in the birth experience interview mimicked topics related to the Adult Attachment Interview—hence the parallel finding.

Elizabeth

Elizabeth had a high birth risk, with a marked lack of control and support and displayed moderate nonfluency. Elizabeth went on to form a disorganized attachment with her infant. Her case is a good example of a mother who may have developed postpartum stress and depression

unrelated to previous unresolved trauma or loss. This is because of her traumatic childbirth experience during which she feared for her baby's physical safety and, perhaps even life. On top of that, the perpetrators of this fear were her two main support figures: her partner and nurse. A birth is said to be traumatic if the mother's or her baby's life was in danger, or if there was a serious threat to the mother's or her baby's physical or emotional integrity (Simkin, 2019), which captures the entirety of Elizabeth's experience. Thus, Elizabeth's development of a disorganized attachment with her infant is not entirely surprising. Postpartum stress, specifically, is related to controlling behavior in the mother-infant dyad and distorted maternal representations of the infant (Forcada-Guex et al., 2011); other studies have found links between post-traumatic stress disorder and infant disorganization (Enlow, Egeland, Carlson, Blood & Wright, 2014).

APPLICATIONS

The findings from the current study suggest several intervention points for health care professionals or clinicians, such as preparation and instruction on labor pain management, mitigation of unnecessary trauma or intervention during childbirth and postpartum screening for nonfluency in recalled birth experiences. Successful intervention on these points may result in mitigations of postpartum stress and mother-infant attachment problems.

FUTURE STUDIES

In order to understand why earlier administration of pain medication is related to infant disorganization, future research should analyze the antecedents of labor pain medication consumption such as maternal prenatal fear of childbirth pain or maternal generalized fear during childbirth and its possible connection to prior unresolved trauma or loss. Additionally, future studies should examine antecedents of nonfluency in birth experience recall, such as mothers'

perceptions of birth trauma and/or prior unresolved trauma or loss, to understand if nonfluency is related to postpartum stress caused by perceived birth trauma which is perhaps exacerbated by unresolved states. Relatedly, the connection between postpartum stress disorder and infant disorganization should be investigated. Lastly, the sample size did not permit disentangling insecure and disorganized infant attachment, causing uncertainty in the current study on the actual effects of the interaction between birth risk and nonfluency on infant attachment insecurity. Thus, future studies should attempt to replicate the current study findings with a larger sample, parsing out organized-insecure and disorganized-insecure infant attachments.

STRENGTHS & LIMITATIONS

This study had much strength in that it utilized a mixed methods approach to uncover deeper understanding of the research questions. Having access to mothers' dialogue about their birth experience gave insight which otherwise would not be possible. Furthermore, it included longitudinal measures from three time points over the transition to parenthood. However, there were some limitations. The structure of the birth experience interview likely affected the quality of the thematic analysis, since mothers were prompted with relatively specific questions that did not necessarily allow for disclosure of deeper sentiments. Additionally, the sample size was small which limited statistical power and the variety of birth experiences captured. Lastly, the study was unable to control for current depression related to the time point of birth interview completion, since the depression scores were unavailable.

CONCLUSIONS

Giving birth to a baby is a monumental event in a woman's life. According to the life course perspective, childbirth is a major life event and part of a critical life transition (Rutter, 1989). Life course events, by definition, are affected by the previous life course and, in turn,

have lasting effects on the physical and mental health throughout the future life course (Osler, 2006). The findings of this dissertation indicate a possibility that either mothers' unresolved state may be behind her vulnerability to a high-risk birth or the presentation of postpartum stress, which result in her nonfluency surrounding the topic. Thus, a mother's past life event of trauma or loss or concurrent birth-related trauma is shaping her experience of childbirth. Traumatic situations or situations that induce feelings of helplessness in the mother, causing her to feel unable to protect her infant, may disorganize the caregiving system on both the behavioral and representational levels (George & Solomon, 1999; Pianta, Marvin, Britner & Borowitz, 1996). The caregiving system is modulated by life events, aspects of childbirth, and infant temperament (George & Solomon, 1999). Hence, in turn, the life event of childbirth goes on to influence the caregiving system and thus the mother-child relationship, specifically mother-infant attachment.

Appendix A

1. Were you aware of your baby's gender before birth?
2. Where was your baby born?
3. What type of delivery did you have?
4. Was your baby born early, on time or late?
5. Did your labor begin naturally or was it induced?
6. From the point at which it was determined that you were in productive labor, what was the total length of time spent in labor through the delivery?
7. What was your child's birth weight?
8. Did your child require any intensive care?
9. Did your child need to remain in the hospital?
10. Was your partner present during labor and delivery?
11. Were any other family member or close friends present?
12. Were you given any pain medication during labor?
13. Was your baby planned?
14. On a scale of 1 to 7 (1 being very unsupportive and 7 being very supportive) please rate the extent to which you felt supported by your partner during childbirth?
15. On a scale of 1 to 7 (1 being very unsupportive and 7 being very supportive) please rate the extent to which you felt supported by your family/close friends during childbirth?
16. On a scale of 1 to 7 (1 being very unsupportive and 7 being very supportive) please rate the extent to which you felt supported by your doctor during childbirth?
17. On a scale of 1 to 7 (1 being very unsupportive and 7 being very supportive) please rate the extent to which you felt supported by your other staff assisting you during childbirth?
18. On a scale of 1 to 7 (1being very easy and 7 being difficult) how would you assess the degree of difficulty of your labor experience?
19. How would you describe the way you were able to cope with childbirth on a scale from 1 to 7 (1 being very poorly and 7 being very well)?

20. Did you experience any complications during childbirth?

21. Did you experience depressive symptoms following the birth of your child?

22. Do you feel that you were well prepared for childbirth?

23. On a scale from 1to 7 (1 being very negative and 7 being very positive) how would you rate your childbirth experience overall?

24. Were you ever pregnant prior to your pregnancy with this child?

25. Have you ever had another child since this child's birth or are you pregnant now?

26. Has your childbirth experience affected you in any way as a parent?

Appendix B

Code	Scale of Increasing Risk			
	1	2	3	4
1. Delivery Mode	Vaginal	Vaginal w/ Intervention	Planned Cesaerean	Unplanned Cesaerean
2. Labor Induction	None	Administered Late in Labor	Administered early in labor	Planned from the Start
3. Prematurity	On time	<40 weeks	<35 weeks	<30 weeks
4. Pain Medication	None	Administered Late in Labor	Administered early in labor	Administered from the Start
5. Place of Birth	Home	Birthing Center	Taken to Hospital during labor	Hospital
6. Control	Full Control: Mother's birth plan was followed and she was able to make active decisions & her wishes were honored throughout	Almost equal instances of control & out of control, but control prevailed* *equal = 2.5	Almost equal instances of control & out of control, but out of control prevailed*	No Control: Birth plan was not followed; Medical Staff did not take mother's wishes into account & directly contradicted wishes; almost no decision could be made by the mother
7. Support	Full Support: Medical staff and family present provided solace and aided in coping at every possible opportunity	Almost equal instances of supportive & unsupportive care, but supportive prevailed* *equal = 2.5	Almost equal instances of supportive & unsupportive care, but unsupportive prevailed*	No Support: Medical staff and family present ignored all pleas for aid and actively made coping difficult
8. Intensive Care	No Intensive care	-	-	Mother and/or infant were treated with intensive care (i.e., major complications or NICU stay)
9. Separation	Mother and Infant received skin to skin contact (naked on mother's chest) and were not separated at any moment in the immediate postpartum, except for brief, one time instances under 5 minutes	Mother and infant were separated for a little less than half the time the first couple of hours postpartum*	Mother and infant were separated for half of the time during the first couple of hours postpartum*	Mother and infant were separated for the majority of the first couple of hours postpartum

		*equal = 2.5		
10. Extended Stay	Mother and Infant were never in hospital	Mother and infant were in the hospital for an expected and normative amount of time (2 days)	Mother or infant needed to stay between 1-24 hours longer than expected	Mother or infant needed to stay more than 24 hours longer than expected
11. Postpartum Depression	No reported feelings of postpartum depression	Described feeling slightly depressed during the postpartum period, but did not provide strong evidence	Felt some postpartum depression symptoms (affecting some parts of functioning but without major life impacts) and described symptoms convincingly	Felt major postpartum depression symptoms (affecting ability to function normally and quality of life) and described symptoms convincingly

Appendix C

Table 6.

Correlations between Maternal Depression, Birth Experience Risk Factors, Birth Interview Speech Patterns and Infant Attachment

	1.	2.	3.	4.	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5	6	7
1. Prenatal Depression	-															
2. 8 month Depression	.21	-														
3. Δ Depression	-	-	-													
4. Total Birth Risk	.09	.22	.13	-												
4.1 Delivery Mode	-.13	-.03	.07	-	-											
4.2 Labor Induction	.18	.25	.11	-	.25	-										
4.3 Pain Medication	-.22	.19	.31†	-	.33*	.28†	-									
4.4 Place of Birth	.13	.22	.10	-	.13	.32†	.32*	-								
4.5 Control	.12	.24	.12	-	.23	.24	.17	.24	-							
4.6 Support	.05	.40*	.34*	-	-.08	.05	-.04	.02	.56***	-						
4.7 Intensive Care	-.18	-.19	-.04	-	.31†	-.06	-.08	-.08	.28†	.25	-					
4.8 Extended Stay	.07	-.23	-.29†	-	.52**	.15	.16	.34*	.24	-.12	.44**	-				

4.9 Postpartum Depression	.41*	.16	-.14	-	-.02	.29†	.05	.02	.29†	.16	.07	.11	-		
5. Nonfluency words	.07	-.09	-.12	.10	-.16	.14	.01	.26	-.06	.005	-.13	-.01	.46**	-	
6. Insecure Infant Attachment	-.07	-.10	-.03	-.10	.04	-.03	-.14	-.07	-.10	-.02	-.01	-.25	.06	.11	-
7. Disorganized Infant Attachment	-.11	.13	.19	.13	-.02	.23	.35*	.21	-.07	.03	-.16	-.18	.17	.35*	-	-

Notes. This is a partial correlation, including the covariate of prenatal family income; †$p < .10$, *$p < .05$, **$p < .01$.

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